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THE EFFECT OF THINNING OF PEACH IN SOUTH-EASTERN ROMANIA

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ABSTRACT

Peach cultivars tend to set up a large number of fruits on the tree and there is a risk that they will remain small, with sour taste and without commercial value (Cepoiu N. and Manolache, 2006). That is why manual fruit thinning is considered effective, even if it is expensive (Costa and Vizzotto, 2000). Thinning is an essential agronomic intervention in peach cultivation, as the final fruit quality largely relies on the success of this technique (Costa et al, 2022). The research observed manual thinning, done at different intensities and its influence on the productivity and fruit quality of 'Filip' and 'Redhaven' peach cultivars. The study was carried out at Research Station for Fruit Growing (RSFG Constanța), between 2021 and 2023. 'Filip' and 'Redhaven' peach cultivars were studied. The fruit trees are 12 years old, the planting distance being 4 m/3 m and the crown shape is improved vase. The experimental variants were: V1- 50 % thinned fruits; V2- no thinning (Control). The fruit on control trees were counted before and after thinning, in May of each year. The studied varieties have different biological potential regarding the blossoming intensity and the fruit yields, favorable or less favorable climatic conditions contributing to this, among other factors. From the presented data we can clearly see that the thinning of fruit does not influence much the production but has a big impact upon the physical qualities of the fruit, such as their weight.

INTRODUCTION

For a long time it was believed that the origin country of the peach, i.e. the place where it is found in wild and where its cultivation probably emerged, is Persia, this resulting from its given name, *Prunus persica,* and from the name it bore among Romans, *Malus persicum*, meaning "Persian apple". However, the researches of the last hundred years have shown that there are notes about peach culture dating approx. 2000 years before this fruit was known by the ancient Greeks and Romans who gave it its name, in China.

In Romania, the peach has been cultivated for a very long time. It was probably introduced by the Romans, during the colonization of Dacia, but it is not excluded that it was brought by the Greeks, in Dobrogea, along with the establishment of the first Greek colonies.

Until 1889, it was mostly cultivated in vineyards, as an isolated tree. Once the first breeding grounds were established, which multiplied and spread the foreign varieties (1889-1890), the peach spread a lot in orchards, larger or smaller.

After 1990, the peach was planted mostly in family gardens and in micro-farms, in different climate and soil conditions, using a variety randomly chosen or imposed by the producer. Under these conditions, one could not speak of a precise destination of the harvest and of the economic growth of the peach plantations.

As for the peach varieties, over 50 Romanian and over 30 foreign varieties are authorized for propagation, being suitable for fresh consumption, 15 nectarines and around 5 varieties for industrialization.

After 2005, the peach culture began to grow, along with the granting of European funds for farmers, worldwide competitive peach orchards were established, industrial as well as family ones, farms whose productions can support the quantities consumed in the markets and supermarkets of orchard basins where the peach finds favorable conditions to harvest superior quality fruit.

To achieve maximum marketable fruit size and optimum quality, peaches should be thinned before the pit hardening stage (https://hos.ifas.ufl.edu/stonefruit/production/thinning-and-cropload-management/). Well thinned peach trees have many benefits, including larger fruit size/value, hastening ripening and increasing antioxidants in fruit. Properly thinned peaches have improved finish and colouring that will be more uniform throughout the crop, improving marketability (https://onfruit.ca/2020/06/19/thinning-peach-trees/). Some studies demonstrated that fruit spacing and thinning influence not just fruit size but also attributes like peel colour and firmness, crucial for market standards (N.A. Deshmukh, 2017). Also, thinning practices support the structural health and longevity of trees by preventing structural damage, and improves the overall efficiency of resource used (Popescu și colab., 1993; Avalos et all., 2013, https://extension.psu.edu/physiology-based-peach-thinning-considerations).

MATERIAL AND METHODS

The study was carried out at the Research Station for Fruit Growing (RSFG Constanța) during three years, between 2021 and 2023. 'Filip' and 'Redhaven' peach cultivars were studied. The fruit trees are 12 years old and the crown is improved vase. The planting distance is 4m/3m. The experimental versions were: V1- 50 % thinned fruit; V2- no thinning (Control). The fruits on the control trees were counted before and after thinning, in order to establish the biological fruiting potential of each variety.

Description of the studied varieties

'Filip' - It is the first variety of peach with flat "sandwich" fruit and white flesh, certified in Romania. The fruit weighs around 55-90 grams and is very flattened, with fine pubescence, the background colour is yellow-green, and the covering one is dark red, distributed in very attractive plates, the flesh is white without red infiltrations, smooth, aromatic with 12-14 % dry matter, the kernel is very small and flattened. It is harvested between 20th July and 5th August. It goes into fruit very quickly and bears fruit abundantly year after year, therefore it must be thinned during spring, when the fruit is the size of a hazelnut.


Figure 1. Filip cultivar

'Redhaven' – is the most common peach cultivar in Romania. The tree is of medium vigour, the leaves are quite large and the flowers are campanulate. It bears fruit on mixed branches with a length of 40-60 cm. The blossoming is spectacular and lasts 10-14 days, the flowers being of rosacea type. The fruit is spherical, slightly asymmetrical, non-adherent to the kernel, with an average weight of 150 gr, very resistant to transport. The colour is golden yellow– carmine red. Ripening period: July.


Figure 2. Redhaven cultivar

According to the cultivation technology of peaches (Cociu V., 1981; Ivascu A., 2009) twin fruits, deformed fruits, those affected by diseases and pests, smaller fruits, or those too close to each other have been removed, as well as those located under branches or in the interior of the crown where light does not penetrate it.

RESULTS AND DISCUSSIONS

Thinning of fruit

The data obtained regarding the number of bound fruit and the number of thinned fruit (Fig.3 and Fig.4) are different from year to year and from variety to variety. If we analyse the values from the experimental period according to table no. 1 (2021-2023) we can note the following:

In the 'Redhaven' variety, most of the fruits were thinned in 2023 (132 fruits), while on average over all years, 124 fruits were thinned, and the most fruits were also harvested in 2023, (258 fruits), while on average over all years, 249 fruits were harvested. It can be noticed as more severe fruit thinning determine a good

yield and the weight of the fruit is bigger. Scientific studies confirm that manual fruit thinning is crucial for enhancing peach yield and fruit size. By reducing the number of fruits on the tree, thinning decreases competition for resources, enabling the remaining fruits to grow larger and improve in quality (Corelli-Grappadelli and Coston, 1991; Chang et all, 2018; Sutton et all, 2020; manual thinning, which involves removing excess fruits, helps to reduce competition among the remaining fruits for nutrients, allowing the tree to focus its resources on fewer but larger fruits (Guglielmo Costa G., Botton A., 2022).

Figure 3. The moment of thinning

Figure 4 Fruit that have reached the ripening stage

The highest fruit number of the 'Redhaven' variety, both thinned and harvested, was obtained in 2023 (390 fruits). In the 'Filip' variety, the most fruits were thinned in 2023, (232 fruits) while on average for all years, 225 fruits were thinned, and the most fruits were also harvested in 2023, (307 fruits), while on average, 274 fruits were harvested overall years. The highest fruit number of the 'Filip' variety, both thinned and harvested, was obtained in 2023 (539 fruits). As an average, between 2021 and 2023, the most fruits were thinned in the 'Filip' variety, 225 compared to the 'Redhaven' variety with only 124. The most fruits harvested were 274 from the 'Filip' variety and an average of 249 from the 'Redhaven' variety, over the 3 studied years. The total number of thinned and harvested fruits was 374 from 'Redhaven' and 499 from the 'Filip' variety.

Table 1

The biological fruiting potential expressed by the total number of bound fruits in the thinned version during 2021-2023

Cultivars	2021			2022			2023			(Average)		
	TF	HF	Total	TH	HF	Total	TH	HF	Total	TH	HF	Total
Redhaven	125	257	382	234	349	132	258	390	124	249	373	234
Filip	224	228	452	299	519	232	307	539	225	274	499	299

Thinned fruit-TF; Harvested fruit- HF

Table 2

Fruit production during 2021-2023

Cultivars	2021		2022		2023	
	kg/tree	t/ha	kg/tree	t/ha	kg/tree	t/ha
Redhaven	25.7	21.408	24.1	20.075	27.1	22.574
Filip	20.3	16.909	21.0	17.493	22.0	18.326

Fruit production was recorded in all 3 years of study and from the results obtained according to table no. 2, we can see that from the 'Redhaven' variety, following manual thinning, we have annual productions of up to 22,574 t/ha in 2023, of superior quality fruit, and from the 'Filip' variety, the highest amount of fruit was also obtained in 2023, with a quantity of 18.326 t/ha.

In 2022, we recorded a production of 20,075 t/ha for the 'Redhaven' variety and 17,493 t/ha for the 'Filip' variety. In 2021, the peach production from the 'Redhaven' variety was 21,408 t/ha and 16,909 t/ha from the 'Filip' flat peach variety.

Both varieties obtained very good quality product following manual thinning and normalization of the fruit amount on the control trees. (Fig. 4, Fig. 5).

Figure 4. Redhaven harvested after thinning

Figure 5. Filip in harvesting stage

CONCLUSIONS

The total number of thinned fruit and harvested was 374 on 'Redhaven' and 499 on the 'Filip' variety, which means that both varieties are very productive, they bind a lot of fruit in years without climatic accidents, therefore thinning is a mandatory technological link in these varieties. From the presented data, we can clearly see that fruit thinning does not influence production much, but has a great impact on the physical qualities of the fruit, such as the average weight of a fruit.

Both varieties obtained very good quality productions following manual thinning and normalization of the fruit amount on the control trees.

In the no thinning treatment, the fruit remained very small, they could not be harnessed on the market, and they were not suitable for industrialization as they did not have enough pulp, they remained tasteless, being sour, and the tree had suffered because it could not develop new vegetative growth for next year's production.

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