

## **The influence of fertilization (organic and mineral) on dry matter and sugar accumulation in the Sunhaven peach cultivars under the conditions of the Banat's field area**

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### **Abstract**

The Sunhaven peach cultivar is a species most often present in the plain area of Banat and in the regions of Dobrogea. This species is recommended to be cultivated in the plain area of Banat and in the regions of Dobrogea because of its peculiarities of growth and fruit bearing and because of its plasticity. Although the fruits are not attractive in appearance, they have a unique flavor and they taste very good.

Several genetic factors have been demonstrated to influence the production, both quantitatively and qualitatively. But beside the genetic factors, the environmental factors are playing a very important role, as well. For this reason the peach tree cannot be cultivated in cold climate areas, or in northern climates with surface-groundwater. From this point of view, the Banat plain area meets all requirements for the cultivation of the Sunhaven peach cultivars. Fertilization is another important aspect of proper peach tree cultivation. If fertilizers are not applied, the peach tree is not encouraged to reach its full potential. Regarding the fruit-bearing age, the peach tree very often bears some fruit (the second year from the seed), but for the process of coming into bearing the peach tree needs proper fertilization, in order to influence the quantity and quality of production. The research that was carried out on the tree-vineyard plantation of the University of Agricultural Science and Veterinary Medicine of the Banat Timișoara demonstrates that the application of both mineral and organic fertilizers has a great influence on the dry matter and sugar accumulation in the Sunhaven peach cultivars.

**Keywords:** fertilizers, factors, environment, qualitative

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### **1. Introduction**

The research was conducted to determine the influence of fertilizers on the chemical properties (sugar and dry matter) of the Sunhaven peach cultivars. The testing was carried out on the Sunhaven peach cultivars; the experiment was monofactorial and it was organized after the pattern of randomized storey blocks, using the 5 experimental variants / in four repetitions. The unique flavor of the peach cultivars is due to the above mentioned chemical properties, which are also the basis of growing nutrient enriched fruits with a beneficial effect on human nutrition. If for

example, that barrier is removed (if fertilizers are abundantly applied), the fruit becomes tasteless, but larger in size than normal, and it will also become too low in nutrients or conversely, it will contain traces of fertilizers (nitrites and nitrates) in fairly large amounts. That is why, the amount of fertilizers applied in our research, even if it is in the fifth variant, is still part of the specific optimum [1-4].

### **2. Materials and Method**

The fertilizers that have been used had the following graduations: v1- unfertilized (witness variant), v2 –

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manure 40 t/ha (organic fertilizer), v3- N<sub>30</sub>P<sub>30</sub>K<sub>30</sub>, v4 - N<sub>45</sub>P<sub>45</sub>K<sub>45</sub> (mineral), v5 – N<sub>90</sub>P<sub>45</sub>K<sub>45</sub> (mineral).

The Sunhaven peach cultivar is an American peach variety obtained through controlled crossings between the *Redhaven* x *SH 50* cultivars (*J. H. Hale* x *Halehaven*) at the Agricultural Experiment Station, East Lansing, Michigan. The peach tree is of average vigor and the fruits predominantly grow on fruit mixed branches with flowering buds located on the ends. The peach tree has a campanulate flower shape. The fruit is large in size (over 120 g) and it is oval-shaped with a pronounced ventral line welding. The flesh is yellow, juicy, and rather soft. The skin is yellowish green striped with red, and it is not too attractive, but it tastes very good. The kernel is semiadherent to the pulp.

It is a highly productive cultivar with large fruits even when the harvest is abundant, but it has moderate resistance when confronted with the attack of the fungus *Taphrina deformans*. The maturation process takes place in early July.

The chemical composition of Sunhaven peach cultivars is rich, but variable, depending on the genetic variety of peaches, on the environmental conditions, on the applied agro-technical methods and on the time of the testing. The chemical

composition of fruits under the influence of the fertilization variants was determined under the following aspects: the content in soluble dry matter and in carbohydrates (sugars). The soluble dry matter has been determined by using the Zeiss hand refractometer as it follows: - from 20 fruits in each variant the fruit pressing method was used to extract the juice and then it was put with a rod on an ebonite plate of the refractometer and the reading process began. That means that there have been performed 20 readings for a variant and the average number of the readings was also taken into consideration.

Regarding the sugar content, this process has been determined by reading the soluble substance on the refractometer using the formula:

$$\text{Sugars \%} = [(\text{read dry matter} \times 4.25) / 4] - 2.5$$

### 3. Results and Discussion

We calculated the arithmetic average of the three years of research for both dry matter and for sugars after data collection for each year separately.



Photo 1. Sunhaven – original photo

The dry matter accumulation in the Sunhaven peach cultivars is greatly influenced by the fertilization process. During the 3 years of research we have observed that in the case of the fifth variant, where N<sub>90</sub>P<sub>45</sub>K<sub>45</sub> was applied, the content of dry matter in the fruit considerably increased, thus there is a significantly positive difference between the percentage of dry matter in the fruits of the fifth variant and the ones of the unfertilized witness variant (Table 1).

Regarding the sugars in Sunhaven peach cultivars, we can observe that in the case of the second variant, in the 3 years of fertilization, the sugar accumulation is almost equal to the sugar accumulation in the cultivars of the unfertilized witness variant. However, increasing the dose of chemical fertilization in case of the fourth (N<sub>45</sub>P<sub>45</sub>K<sub>45</sub>) and fifth variants (N<sub>90</sub>P<sub>45</sub>K<sub>45</sub>) has led to a considerable accumulation of sugars (over 10%) in the Sunhaven peach cultivars (Table 2 and Figure 2).

**Table 1.** Effective dry matter in Sunhaven peach cultivars on the period 2009-2011

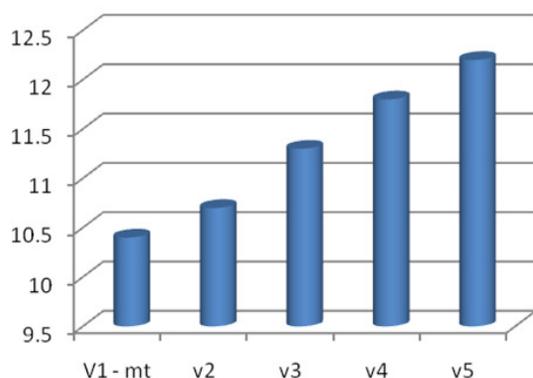
The variant	The carbohydrates (sugars) (%)	The relative value (%)	The difference compared to the witness (%)	The signification
V <sub>1</sub> - mt. unfertilized	10.40	100.00	0.00	wt.
V <sub>2</sub> (manure 40t/ha)	10.70	103.24	0.30	-
V <sub>3</sub> (N <sub>30</sub> P <sub>30</sub> K <sub>30</sub> )	11.30	108.39	0.90	x
V <sub>4</sub> (N <sub>45</sub> P <sub>45</sub> K <sub>45</sub> )	11.80	113.26	1.40	x
V <sub>5</sub> (N <sub>90</sub> P <sub>45</sub> K <sub>45</sub> )	12.20	117.06	1.80	xx

DL5% = 0.51; DL1% = 1.63; DL0.1% = 2.76

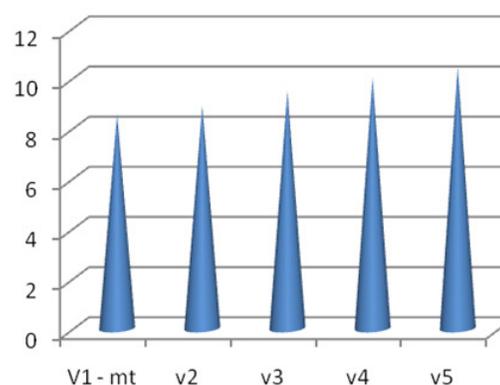
**Table 2.** Glucides (sugars) in the Sunhaven peach cultivars on the period 2009-2011

The variant	The carbohydrates (sugars) (%)	The relative value (%)	The difference compared to the witness (%)	The signification
V <sub>1</sub> - mt. unfertilized	8.55	100.00	0.00	wt.
V <sub>2</sub> (manure 40t/ha)	8.90	104.15	0.35	-
V <sub>3</sub> (N <sub>30</sub> P <sub>30</sub> K <sub>30</sub> )	9.47	110.82	0.91	x
V <sub>4</sub> (N <sub>45</sub> P <sub>45</sub> K <sub>45</sub> )	10.00	117.16	1.45	x
V <sub>5</sub> (N <sub>90</sub> P <sub>45</sub> K <sub>45</sub> )	10.43	122.07	1.88	xx

DL5% = 0.54; DL1% = 1.72



**Figure 1.** Effective dry matter (%) in Sunhaven peach cultivars on the period 2009-2011



**Figure 2.** Glucides (sugars, %) in the Sunhaven peach cultivars on the period 2009-2011

#### 4. Conclusion

The environmental factors were favorable during the 3 years of research, with the exception of 2010. The average results of these three years of experiment show that it is necessary to apply fertilizers, either organic or mineral, in order to improve the product quality. Besides the aforementioned accumulations, the appearance of the Sunhaven peach has also improved, and its flavor and taste is better than of the fruits in the witness variant.

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