

Research regarding the influence of foliar fertilizers on two peach varieties

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Abstract

Foliar fertilizers play an important role in obtaining good-quality crops. Foliar fertilizers have countless benefits for plants, produce a rapid effect and are easily assimilated. Foliar fertilizers also increase plant resistance to diseases and pests thus decreasing the need for chemical fertilizers which have a negative impact on the environment. The presented data are partial results of the PhD thesis. The experiment was carried out during 2024, at the fruit tree nursery in Lugoj, Timis County (45°42'22.1"N 21°51'36.1"E). To carry out the research we analyzed two peach varieties: 'Maria Bianca' and 'Piros Magdalena'. The varieties were treated with three foliar fertilizers in three different growth phenophases. The used foliar fertilizers were the following: Albit, Cropmax and Naturamin Plus, all of them being organic fertilizers. Regarding fruit size index and fruit mass, the best results were obtained when foliar fertilizers were used. Also, the stone percentage was lower in the fertilized variants.

Keywords: fruit mass, soluble solid content, size index, fruit hardness

Introduction

Peach is one of the most appreciated temperate fruit species due to the special qualities of the fruit, as well as due to the biological characteristics of the tree [5, 6, 10].

Peaches can be eaten both fresh and processed as compote, jam, juice, nectar, etc. Fresh peaches stimulate gastric secretion, facilitate digestion and, through the pectic substances and cellulose they contain, improve intestinal peristalsis, thus improving the intestinal transit [4, 5, 6, 10].

Peach consumption has innumerable therapeutic benefits including impact on heart, chemoprevention, maintaining eye health, preventing obesity, neurodegenerative diseases and has antidiabetic activity too [4, 14].

Peach responds particularly well to fertilizers, so fertilization of young and fruit-bearing plantations is a crucial link [2, 3, 9].

It is a great consumer of nutrients, with corresponding effects on the yield it produces. Peach consumes more macroelements than apple, pear or plum [1, 9, 12, 15].

Moreover, foliar fertilizers have several advantages and benefits that increase the resistance of plants during periods of stress (drought, frost, hail) to pests and diseases, thus reduce the number of fungicide and insecticide treatments that have a negative impact on the environment [7, 8, 11, 13].

Material and Method

Two peach varieties were analyzed for the research: 'Maria Bianca' and 'Piros Magdalena' (Figure 1 and Figure 2). Each variety was treated with 3 foliar fertilizers in three different growth phenophases, for each variety we chose controls to which no fertilization was applied. The foliar fertilizers used were: Albit (150 mL/ha), Cropmax (1.5 L/ha), Naturamin Plus (1 kg/ha), all 3 being organic fertilizers. The first treatment was applied on 17.05.2024, the second on 07.06.2024, and the third treatment on 28.06.2024.

The research was carried out at the fruit tree nursery in Lugoj, Timis County (45°42'22.1"N 21°51'36.1"E), in 2024.

The trees were planted in the nursery in 2015, at a distance of 4*4 m trees per row, being a classic orchard system. For the two varieties of peach the Oradea rootstock was used, the height of the trunks is about 80 cm, and the shape of the crown is improved vase.

To determine fruit quality, we analyzed several parameters such as size index, fruit mass, fruit firmness, soluble solids content and stone percentage. For each parameter, 15 fruits picked at optimal maturity were analyzed.

To determine the size index, the large diameter, small diameter and height of the fruits were measured with a caliper and then the formula $Si=(D+d+h)/3$ (Si =Size index; D =large diameter; d =small diameter, h =height) was used.

The fruit mass was measured using the Kern PES620-3M analytical balance, fruit firmness was determined using the Lutron FR-5105 penetrometer, and the soluble solids content was determined using the ATAGO PAL 3870 digital refractometer. The stones were weighed separately and their percentage was calculated based on the fruit weight.

Data were analyzed using SAS Studio SAS® Studio 3.8 software, with application of the One Way Anova test.



Figure 1. 'Piros Magdalena'



Figure 2. 'Maria Bianca'

Results and Discussion

Size index (Figure 3)

'Maria Bianca' fruits ranged in size from 53.83 mm (control) to 63.21 mm (Albit), with a mean of the experience of 59.98 mm. The best results were obtained with Albit fertilizer (mean 61.53 mm) and the worst in the case of the control (mean 55.85 mm). There were no significant differences ($p=0.0633$).

Fruits of 'Piros Magdalena' variety ranged in size from 53.13 mm (control) to 69.51 mm (Cropmax), with a mean of 61.84 mm. The best results were obtained with the Cropmax fertilizer (mean 66.51 mm) and the worst in the case of the control (mean 55.85 mm). Significantly positive differences were recorded for two fertilizers (Cropmax and Albit) in comparison with the experiment control, but also with Naturamin fertilizer.

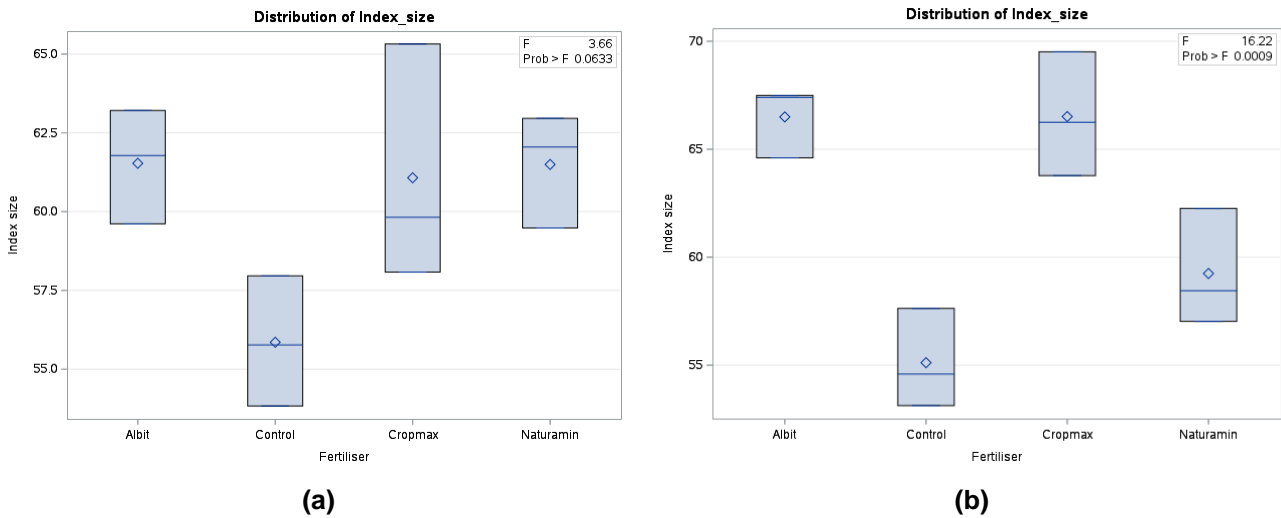


Figure 3. The influence of the fertilisers on the index size: (a) 'Maria Bianca'; (b) 'Piros Magdalena'

Fruit mass (Figure 4)

The fruit mass of 'Maria Bianca' variety ranged from 100.00 g (control) to 176.90 g (Cropmax), with a mean of the experiment of 137.30 g. The best results were obtained with Cropmax fertilizer (mean 150.67 g) and the worst for the control (mean 111.70 g), with no significant differences recorded (p=0.1313).

The fruit mass of 'Piros Magdalena' variety ranged from 100.00 g (control) to 228.20 mm (Albit), with a mean of the experiment of 164.23 g. The best results were obtained with Albit fertilizer (mean 200.07 g) and the worst in the case of with control (mean 114.33 g). There were positively significant differences for two fertilizers (Albit and Cropmax) compared to the control of the experiment.

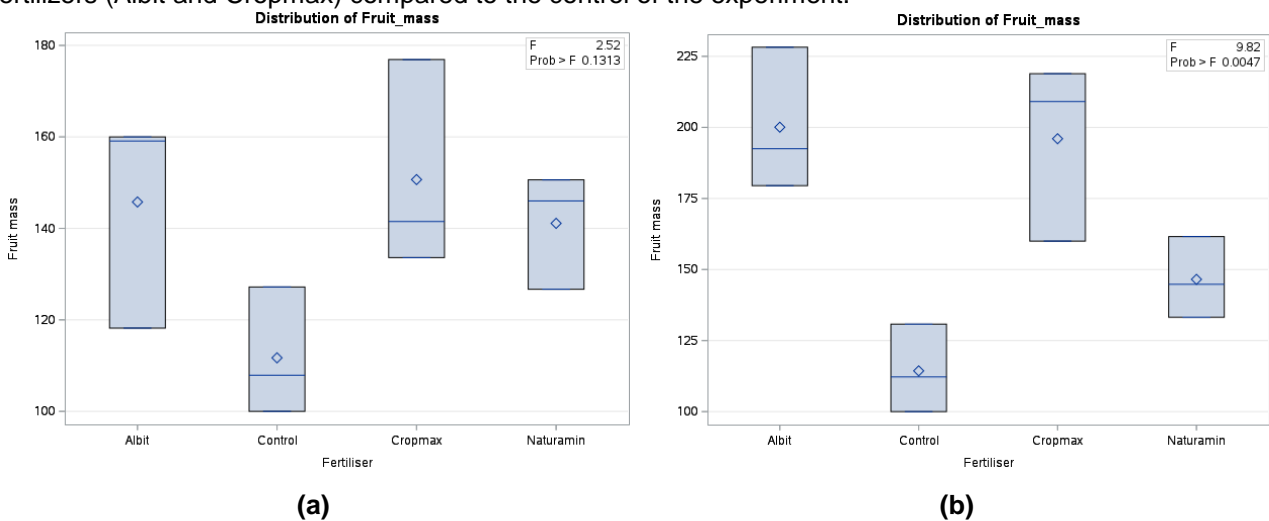


Figure 4. The influence of the fertilisers on the fruit mass: (a) 'Maria Bianca'; (b) 'Piros Magdalena'

Fruit hardness (Figure 5)

The fruits of the 'Maria Bianca' variety had their firmness ranging from 318.00 kg/cm² (Naturamin) to 1586.00 kg/cm² (Cropmax), with an average of 917.25 kg/cm². The highest values were obtained when applying the Cropmax fertilizer (mean 1461.67 kg/cm²) and the lowest with Naturamin treatment (mean 531.33 kg/cm²). There were positively significant differences for the control and Cropmax compared to Naturamin and Albit fertilizers.

The fruits of the 'Piros Magdalena' variety had their firmness ranging from 261.00 kg/cm² (Albit) to 1240.00 kg/cm² (control), with a mean of the experiment of 699.33 kg/cm². The best results were obtained in case of the control (mean 1139 kg/cm²) and the worst in case of Albit treatment (mean 308.67 kg/cm²). There were positively significant differences for the control and Naturamin variants compared to Albit and Cropmax.

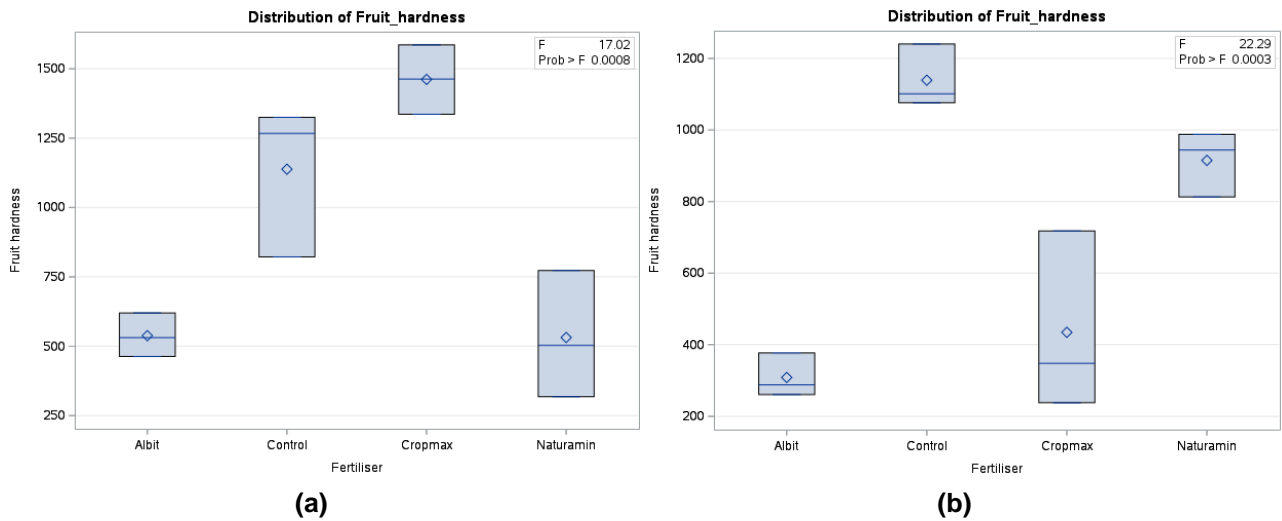


Figure 5. The influence of the fertilisers on the fruit hardness: (a) 'Maria Bianca'; (b) 'Piros Magdalena'

Soluble solid content (Figure 6)

The soluble solid content of the fruits of 'Maria Bianca' variety ranged between 14.20 %Brix (Cropmax) and 17.10 %Brix (Albit), the average of the experiment being 16.20 %Brix. The highest values were recorded for Albit fertilizer (mean 16.83 %Brix) and the lowest for Cropmax fertilizer (15.43 %Brix), but without significant differences (p=0.7320).

The soluble solid content in the case of 'Piros Magdalena' variety ranged between 18.80 %Brix (control) and 18.00 %Brix (Naturamin), with an average of the experiment of 14.98 %Brix. The highest values were recorded for Naturamin fertilizer (mean 16.23 %Brix) and the lowest for the control (13.47 %Brix), but without significant differences (p=0.4211).

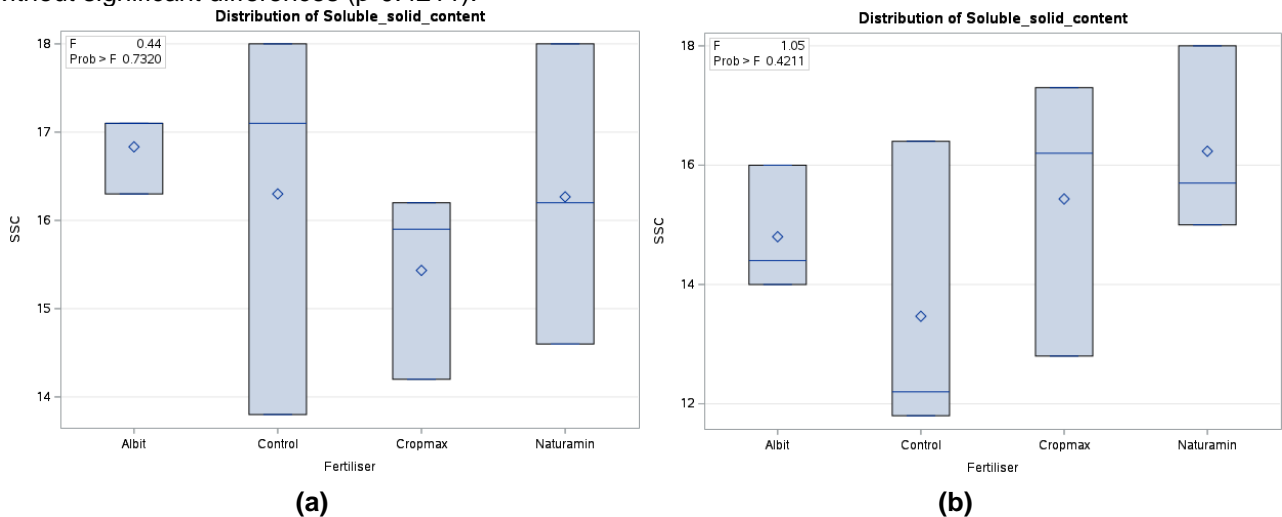


Figure 6. The influence of the fertilisers on the soluble solid content: (a) 'Maria Bianca'; (b) 'Piros Magdalena'

Stone percentage (Figure 7)

'Maria Bianca' fruits had stone percentage values ranging from 3.59% (Cropmax) to 5.90% (control), with a mean of the experiment of 4.54%. The lowest values were recorded for the Cropmax fertilizer (3.93%) and the highest for the control (5.21%). There were positively significant differences for the Cropmax fertilizer compared to the control of the experiment.

The fruits of the 'Piros Magdalena' variety had stone percentage values ranging from 4.29 % (Albit) to 8.40 % (control), with an average of the experiment of 6.00 %. The best results were recorded for Albit (4.62 %) and the worst in the case of the control (7.86 %). There were significantly positive differences for Albit and Cropmax fertilizers compared to the control of the experiment.

It is worth noting that in both varieties, stones were smaller when foliar fertilizers were used.

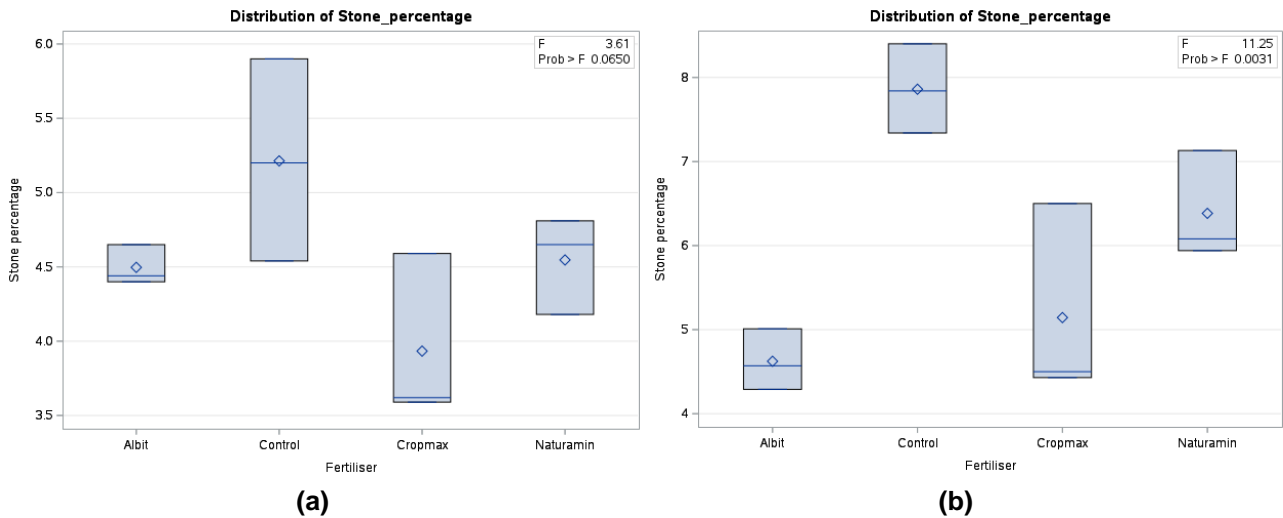


Figure 7. The influence of the fertilisers on the stone percentage: (a) 'Maria Bianca'; (b) 'Piros Magdalena'

Conclusions

The two tested peach varieties behaved differently based on the fertilizers used. In terms of size index and fruit mass, the control recorded the lowest values in both varieties compared to the other variants, but without significant differences.

Regarding fruit firmness, the results were very different, in the case of 'Maria Bianca' the highest fruit firmness was recorded with the use of Cropmax fertilizer and the control, and in the case of 'Piros Magdalena' the highest fruit firmness was recorded in the control and with Naturamin fertilizer, in both cases with significant differences. Interestingly, Naturamin fertilizer reduced firmness in 'Maria Bianca' and increased it in 'Piros Magdalena' variety.

There were no significant differences in the soluble solid content, the results being different from one variety to another and from one variant to another.

Concerning the stone percentage, it should be noted that in both varieties, stones were smaller when foliar fertilizers were used. The lowest kernel percentage was recorded when Cropmax fertilizer was used, followed by Albit fertilizer.

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