Effect of Spraying with Nutrition Solution and Organic Fertilizer in Some Vegetative Growth Characteristics of Peach Seedlings Cv. Red June.

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Abstract: This study was conducted in Iraq / Baghdad Al-Yusufiya for the season 2019 to study the effect of spraying with Nutrition Solution and organic Fertilizer in some vegetative growth characteristics of peach seedlings. The nutrient spray (F) was used with four concentrations (F 0) 0, (F 1) 1.5, (F 2) 3, (F 3) 4.5ml.l⁻¹ and organic fertilizer spraying (B) with four concentrations (B 0) 0, (B 1) 3, (B 2) 4, (B 3) 5 ml.l⁻¹. The results showed that F 3 recorded the higher value of plant height, leaves area, chlorophyll content, nitrogen(%), phosphorus(%), potassium(%), and carbohydrate, nitrogen and C/N ratio which gave 34.86 cm, 3819 cm², 256.4 mg.100g⁻¹fresh weight, 1.73%, 0.53%, 2.74%, 2.73%, 28.34% and 10.35% respectively. Likewise, spraying, treatment (B 3) exceeded the rate of increase in plant height, leaves area, chlorophyll content, nitrogen(%), phosphorus(%), potassium(%), carbohydrates, nitrogen and C/N ratio was 32.06 cm, 34.10 cm², 254.5 mg.100g⁻¹fresh weight, 1.52%, 0.45%, 2.10%, 2.52%, 23.12% and 9.08% respectively. As for the interaction between the studied factors (F 3B 3) achieved the highest value in plant height, leaves area, chlorophyll content, nitrogen(%), phosphorus(%), potassium(%), carbohydrates and nitrogen which gave 37.31 cm, 43.72 cm², 277.4 mg.100g⁻¹fresh weight, 1.87% 0.58%, 2.99%, 2.88% and 29.56% respectively.

1. Introduction

Peach (Prunus persica L.) is one of the most important economic, nutritional and important stone fruits in the world (1). Its native is China, which has been growing for more than 2000 years BC. From there it moved to Iran (2). The productivity of the world's peach tree is 16.854 kg, and the total production was 25737841 tons per year, while the productivity of one tree in Asia was 17.231 kg. Tree-1 and a number of trees reached 1073179 trees with a relatively high productivity of 18492088 tons (3). Chemical fertilizers are essential for the nutrition of fruit trees, which are reflected in the growth of these trees. Nitrogen is the main component of protein formation, which is mainly found in the composition of the protoplasm. It is also used in the formation of amino acids, lecithin, chlorophyll and plant hormones. Nitrogen increases plant growth and productivity, the lack of it leads to the weakness of growth and the color of its leaves. Phosphorus is the key to growing trees, increasing the number of productive branches and providing them with adequate food. This is important for the process of photosynthesis and its entry into bioenergy compounds in the plant it also increase carbohydrate in fruits and thus accelerates maturity. Potassium is an important nutrient in the plant and is a promoter of enzymes that help build proteins and make carbohydrates and is a productive factor, which leads to increased sugars (4). Despite the efficiency of chemical
fertilizers in improving plant growth, it is scientifically proven that these substances are hazardous to the environment and human health, so modern agricultural policy seeks to provide nutrients that improve plant growth and environmental degradation and contribute to increasing plant tolerance for in appropriate environmental conditions (5). The addition of organic fertilizers in liquid form can achieve some additional benefits, as it can be readily prepared and given a bribe to the vegetative or irrigation water as it is free from bush seeds, fungus and other pathogens (6), as well as being safe for the environment (7). A number of imported organic fertilizers are available in the local markets, such as seaweed extracts, which have been studied in many studies and have shown their role in improving plant growth characteristics (8). In order to achieve these objectives, And has been shown to be effective in improving the growth and yield of different horticultural plants (9 and 10).

Found (11) that spraying peach seedlings with a 5 gl-1 nutrient solution resulted in increased leaf content of nitrogen, phosphorus and potassium and carbohydrate content (12). Noted that spraying organic fertilizer on pears resulted in increased leaf content Nitrogen and potassium. The aim of this study is to enhance the vegetative growth of the seedlings, which helps their rapid arrival to the flower stage and study their response to treatment with nutritious solution and organic fertilizer in building a strong structure and reducing the use of chemical fertilizers because of its negative effects in the environment and human health.

2. Materials and Methods

The experiment was carried out in the private orchard at Yusufiya township / Baghdad to study the effect of spraying with the nutrient solution under the commercial name ‘Foliartal’ and organic fertilizer under the commercial name ‘Botryfun’ in some growth characteristics of peach during 2019 season, where all horticultural practices were performed on all seedlings. The study included a two-factor as described below:

Spray with nutrient solution ‘Foliartal’: It include Four concentrations control (F0), 1.5 ml.l-1 (F1), 3 ml.l-1 (F2) and 4.5 ml.l-1 (F3).

Spraying organic fertilizer (Botryfun):It include Four concentrations control(B0), 3 ml.l-1 (B1) and 4 ml.l-1 (B2) and 5 ml.l-1 (B3).

Thus, the experiment will be 4×4 according to the Randomized Complete Block Design, with three replicates and one seedling for the experimental unit. The spraying of the nutrient solution and organic fertilizer was carried out at the beginning of April and the second was done after 2 weeks from the first spray, the results were analyzed according to the statistical program GenStat and the differences between means were made by F-test and the least significant difference at P= 0.05 according to (13), and then the following traits were measured.

2.2 Plant height increment (cm): Plant height from the vaccination area was measured to the highest height of the plant using the metric bar at the beginning of the growth season (end of February) and in October and taking the difference between the readings to indicate the increase in plant height and growth seasons.

2.3 Leaf Area (cm 2): It was calculated by taking 10 leaves full width and different directions of each seedlings at the end of the growing season and weighed after the separation of the necks and were strung on top of each other and then pierced with holes 1cm diameter and placed Leafs and discs in a kiln temperature 65 ° C for 72 hours until proven weight, after which the average area of the Leaf was calculated

2.4 Chlorophyll Content (mg. 100 g-1 fresh weight): It was estimated at the end of June by sampling 0.2 g of Leaf from different directions of the seedlings. The chlorophyll was extracted by organic solvent acetone (80%) and then Spectro Photometer spectroscopy on 668, 645 nm (14).

2.5 nitrogen (%): Nitrogen was estimated from the leaves extracts at the end of June using the Micro Kjehldal digestion method (15).
2.6 phosphorus( %) : phosphorus was estimated in leaf extracts at the end of June using spectrophotometer spectroscopy and wavelength 620 (16).

2.7 Potassium( %): Potassium was estimated at the end of June using the Flam Photometer (17)

2.8 carbohydrates(%): Carbohydrate content was measured by method (18).

2.9 Nitrogen( %): Nitrogen content was calculated according to method Micro Kjehldal digestion.

2.10 C / N Ratio : calculated by dividing the percentage of carbohydrates to the nitrogen.

3. Results and Discussion

The results of Table (1) showed that nutrient solution significantly affected the rate of increase of peach seedlings, F3 showed a significant increase over the rest of the treatments, with an increase rate of 34.86 cm compared with F0, which recorded the lowest rate of 26.70 cm. As for the organic fertilizer has a significant effect on the rate of increase, B3 gave the highest rate of 32.06 cm compared to B0, which gave the lowest rate of 29.50 cm.

The interaction between the treatments showed that treatment F3B3 significant superiority on all treatments was 37.31 cm compared with F0B0 which gave 26.11 cm. The reason for the increase in the length of the branches (Table 1) may be due to the role of the nutritious solution Foliartal in filling the plant's need for the essential nutrients necessary for photosynthesis, breathing and various metabolic processes for the solution of the major elements (K, P, N) (19). The increase in the length of the branches is due to the role of potassium in the promotion of histopathological tissue on the division of living cells and activate the process of photosynthesis and the transfer of materials represented by leaves and movement in the transition from old leaves to the young leaves (20).

The organic fertilizer contains a number of major and minor nutrients and potassium is of great importance in increasing the metabolic activities of the plant. It is necessary in activating the enzymes of the manufacture of amino acids and protein and helps in the manufacture of chlorophyll and the formation of sugars, proteins and ATP energy compounds that affect the growth and size of the plant (21)

Table (1) Effect of Spraying with Nutrient Solution and Organic Fertilizer on Plant height (cm)

| Rate F | B0 | B1 | B2 | B3 | Transactions |
|--------|----|----|----|----|--------------|
| 26.70  | 26.11 |
| 29.27  | 29.79 |
| 31.79  | 31.16 |
| 34.86  | 34.28 |
| 32.06  | 30.27 |

| Rate B | F×B | B | F |
|--------|-----|-----|-----|
| 2.94   | 1.47 | 1.47 | LSD 5% |

The results of Table (2) showed the moral superiority of the nutritious solution in the area of the Leaf. The treatment F3 gave a significant superiority over the rest of the coefficients, reaching 38.19 cm² compared with F0, which gave the lowest value 25.44 cm². Either for organic fertilizer has a significant effect in the leaf area B3 gave the highest value of 34.10 cm² compared to the comparison gave the lowest value of 29.99 cm².

The interaction between the treatments showed that F3B3 gave a significant superiority on all treatments of 43.72 cm² compared to F0B0, which gave the value of 25.03 cm².
Table (2) Effect of spraying with nutritious solution and organic fertilizer in leaf area (cm²)

| Rate | B₀ | B₁ | B₂ | B₃ | Transactions |
|------|----|----|----|----|--------------|
| F₀   | 25.44 | 25.16 | 25.83 | 25.73 | 25.03 |
| F₁   | 28.59 | 32.05 | 28.47 | 27.16 | 26.67 |
| F₂   | 34.97 | 35.47 | 36.23 | 34.64 | 33.52 |
| F₃   | 38.19 | 43.72 | 39.70 | 34.61 | 34.74 |
|      | 34.10 | 32.56 | 30.54 | 29.99 | Rate B     |

The results of Table (3) showed a significant effect on the chlorophyll content, which significantly exceeded F₃ on all treatments, which reached 265.4 Mg.100 g⁻¹ fresh weight, While F₀ recorded the lowest rate was 237.0 Mg.100 g⁻¹ fresh weight. The organic fertilizer had a significant effect on chlorophyll, B₃ recorded the highest value of 254.5 Mg.100 g⁻¹ fresh weight, while B₀ recorded the lowest value of 244.2 Mg.100 g⁻¹ fresh weight. As for the interaction between the treatments, F₃B₃ was significantly higher on all the treatments, which gave the highest value of 277.4 Mg.100 g⁻¹ fresh weight while the treatment F₀B₀ was the lowest rate of 231.5 Mg.100 g⁻¹ fresh weight.

Table (3) Effect of spraying with nutrient solution and organic fertilizer in chlorophyll (mg.100 g⁻¹ fresh weight):

| Rate F | B₁ | B₂ | B₃ | B₄ | Transactions |
|--------|----|----|----|----|--------------|
| F₀     | 231.5 | 234.5 | 240.8 | 240.9 | 231.5 |
| F₁     | 240.7 | 241.9 | 250.9 | 255.7 | 240.7 |
| F₂     | 251.6 | 253.9 | 259.8 | 258.4 | 246.1 |
| F₃     | 265.4 | 277.4 | 259.8 | 265.8 | 258.4 |
|        | 254.5 | 251.2 | 246.8 | 242.2 | Rate B     |

The reason for the increase in leaf area and chlorophyll (Table 2 and 3) may be due to the positive effect of the nutrient solution Foliartal, which contains the major elements of the KPN as a ready-made form, which have a role in the formation of amino acids and nuclei and important enzymes in vegetative growth and the emergence of chlorophyll are the basis for photosynthesis, which increases the proportion of processed materials and increases vegetative growth rates (22). The role of organic fertilizer is due to the fact that it contains a number of major and minor elements that meet the need for vegetative aggregation leading to increased cell division and expansion Thus increasing the expansion of the leaves and improve the vegetative growth of the strength of the seedlings are increased leaf area thereby increasing the efficiency of photosynthesis and chlorophyll content of leaves (23).

The results of Table (4) indicate that the spraying of the nutritious solution has a significant effect on the content of nitrogen. F₃ has a significant effect on all the treatments as it reached 1.73% compared to F₈ which gave the lowest value 1.22%. As for organic fertilizer spraying, it had a significant effect on the content of the leaves of nitrogen. The treatment of B₃ was 1.52% compared to B₀, which gave the lowest percentage of 1.38%.The interaction between the spraying treatments with nutrient solution and organic fertilizer spraying treatments, it had a moral superiority. F₃B₃ had a significant effect on all treatments which reached 1.87% compared to F₀B₀ which gave the lowest value of 1.18%.
Table (4) Effect of spraying with nutrient solution and organic fertilizer in nitrogen (%)

| Rate F | B0  | B1  | B2  | B3  | Transactions |
|-------|-----|-----|-----|-----|-------------|
| F0    | 1.22| 1.26| 1.24| 1.21| 1.18        |
| F1    | 1.31| 1.36| 1.34| 1.28| 1.27        |
| F2    | 1.50| 1.59| 1.52| 1.48| 1.43        |
| F3    | 1.73| 1.87| 1.74| 1.66| 1.65        |
| Rate B| 1.52| 1.46| 1.41| 1.38|             |

The results of Table (5) showed that the spray with the nutrient solution had a significant effect on the content of the leaves from the phosphorus. F3 recorded a significant increase on all the treatments, which reached 0.53% compared to the F0 which recorded the lowest percentage of 0.28%. As for the spraying of organic fertilizer on peach seedlings has a significant effect in the content of the leaves of phosphorus, where B3 significantly higher on all spraying treatments of 0.45%, while the comparison B0, the lowest rate of 0.38%. The interaction between the spray treatments, it significantly affected the content of the leaves of phosphorus. F3B3 recorded the moral superiority over all interference coefficients was 0.58% while the F0B0 was the lowest of 0.24%.

Table (5) Effect of spraying with nutrient solution and organic fertilizer in phosphorus (%)

| Rate F | B0  | B1  | B2  | B3  | Transactions |
|-------|-----|-----|-----|-----|-------------|
| F0    | 0.24| 0.26| 0.30| 0.26| 0.24        |
| F1    | 0.38| 0.40| 0.39| 0.38| 0.33        |
| F2    | 0.48| 0.51| 0.48| 0.47| 0.45        |
| F3    | 0.53| 0.58| 0.55| 0.50| 0.50        |
| Rate B| 0.45| 0.43| 0.40| 0.38|             |

The results of Table (6) indicate that the spraying of the nutritious solution had a significant effect on the content of the leaves of the peach seedlings of potassium. The transaction F3 showed a significant superiority over the rest of the transactions of 2.77% compared to F0, which recorded the lowest percentage of 1.60%. As for spraying organic fertilizer significantly affected the content of the leaves of potassium as the transaction B3, a significant superiority on all spraying transactions, at 2.99%, while the comparison B0, the lowest rate of 1.85%. The interaction between treatments showed that F3B3 had a significant effect on all the treatments reached 2.99% higher content of leaves of potassium while the comparison F0B0 was the lowest rate of 1.50%.

Table (6) Effect of spraying with nutrient solution and organic fertilizer in Content of potassium (%)

| Rate F | B0  | B1  | B2  | B3  | Transactions |
|-------|-----|-----|-----|-----|-------------|
| F0    | 1.50| 1.57| 1.63| 1.53| 1.50        |
| F1    | 1.69| 1.69| 1.71| 1.70| 1.67        |
| F2    | 1.86| 1.86| 2.06| 1.85| 1.73        |
| F3    | 2.74| 2.74| 2.99| 2.78| 2.50        |
| Rate B| 2.10| 2.10| 1.99| 1.94| 1.85        |

LSD 5%
Tables (4, 5 and 6) show the increased concentration of the elements by increasing concentrations of the nutritious solution and organic fertilizer. The solvents contain the large and micro elements in a form that can be absorbed by the leaves, It is of great importance to improve the growth of peach seedlings through the arrival of elements faster than if they were added to the soil as they may be susceptible to sedimentation, washing and stabilization, especially in the prevailing soils of Iraq (24). Therefore, the increased concentration of the above elements may be due to their absorption directly through the stomata (25). This contributes to the increase of vital events, which leads to increased absorption with the rest of the other elements to bring the state of nutritional balance (26).

The results of Table (7) showed the significant effect of the spray with the nutrient solution in the content of the branches of the carbohydrates. F3 showed a significant superiority over all the treatments which reached 2.73% while F0 recorded the lowest percentage of 2.20%. As for the organic fertilizer spraying, it significantly affected the content of the branches of carbohydrates. The treatment B3 recorded the highest percentage of 2.52%, while the comparison B0 recorded the lowest percentage of 2.36%. As for the interaction between the spraying treatments with nutrient solution and spraying with organic fertilizer, it resulted in a significant effect on the carbohydrate content of the branches. The treatment F3B3 showed a significant superiority over all the treatments, which gave the highest percentage of 2.88% while the comparison of F0B0 was the lowest ratio of 2.14%.

| Transactions | Rate F | B0 | B1 | B2 | B3 | Rate F | B0 | B1 | B2 | B3 |
|--------------|--------|----|----|----|----|---------|----|----|----|----|
| B0           | 2.14   | 2.18| 2.22| 2.34| 2.39| 2.57    | 2.73| 2.50| 2.55| 2.55|
| B1           | 2.18   | 2.32| 2.35| 2.32| 2.35| 2.47    | 2.50| 2.41| 2.50| 2.55|
| B2           | 2.22   | 2.30| 2.39| 2.32| 2.47| 2.69    | 2.80| 2.41| 2.50| 2.69|
| B3           | 2.14   | 2.30| 2.44| 2.44| 2.47| 2.57    | 2.69| 2.41| 2.50| 2.69|

The results of the table (8) showed that the spraying of the nutrients solution had a significant effect on the nitrogen content of the branches. The treatment of F3 showed a significant increase of 28.34% compared with the lowest rate of 17.95%. As for organic fertilizer spraying, there were significant differences between the averages of the transactions and the transaction B3 recorded the highest percentage, which was significantly higher on all the transactions amounted to 23.12% compared to the comparison, which gave the lowest rate of 20.69%.

The interaction between the spraying treatments had a significant effect on the content of the branches of the nitrogen. The treatment F3B3 had a significant effect on all interference factors except the treatment F3B2, which did not differ significantly with 29.56% and 29.00% respectively compared to the lowest rate of 17.22%.

| Transactions | Rate F | B0 | B1 | B2 | B3 | Rate F | B0 | B1 | B2 | B3 |
|--------------|--------|----|----|----|----|---------|----|----|----|----|
| B0           | 17.22  | 18.43| 17.62| 19.05| 19.42| 20.49    | 20.95| 21.63| 23.20| 24.46|
| B1           | 17.62  | 18.78| 19.05| 19.42| 19.80| 20.95    | 22.25| 21.63| 23.20| 24.46|
| B2           | 18.43  | 19.78| 20.15| 20.52| 20.90| 21.95    | 23.25| 22.63| 24.20| 25.46|
| B3           | 17.22  | 18.51| 19.05| 19.42| 19.80| 20.95    | 22.25| 21.63| 23.20| 24.46|

The results of Table (8) showed the significant effect of the spray with the nutrient solution in the content of the branches of carbohydrates. F3 showed a significant superiority over all the treatments which reached 2.73% while F0 recorded the lowest percentage of 2.20%. As for the organic fertilizer spraying, it significantly affected the content of the branches of carbohydrates. The treatment B3 recorded the highest percentage of 2.52%, while the comparison B0 recorded the lowest percentage of 2.36%. As for the interaction between the spraying treatments with nutrient solution and spraying with organic fertilizer, it resulted in a significant effect on the carbohydrate content of the branches. The treatment F3B3 showed a significant superiority over all the treatments, which gave the highest percentage of 2.88% while the comparison of F0B0 was the lowest ratio of 2.14%.

| Transactions | Rate F | B0 | B1 | B2 | B3 | Rate F | B0 | B1 | B2 | B3 |
|--------------|--------|----|----|----|----|---------|----|----|----|----|
| B0           | 2.14   | 2.30| 2.44| 2.57| 2.73| 2.57    | 2.73| 2.44| 2.57| 2.73|
| B1           | 2.30   | 2.44| 2.57| 2.73| 2.90| 2.73    | 2.90| 2.57| 2.73| 2.90|
| B2           | 2.44   | 2.57| 2.73| 2.90| 3.06| 2.90    | 3.06| 2.73| 2.90| 3.06|
| B3           | 2.57   | 2.73| 2.90| 3.06| 3.23| 2.90    | 3.23| 2.73| 2.90| 3.23|

The results of the table (8) showed that the spraying of the nutrients solution had a significant effect on the nitrogen content of the branches. The treatment of F3 showed a significant increase of 28.34% compared with the lowest rate of 17.95%. As for organic fertilizer spraying, there were significant differences between the averages of the transactions and the transaction B3 recorded the highest percentage, which was significantly higher on all the transactions amounted to 23.12% compared to the comparison, which gave the lowest rate of 20.69%.

The interaction between the spraying treatments had a significant effect on the content of the branches of the nitrogen. The treatment F3B3 had a significant effect on all interference factors except the treatment F3B2, which did not differ significantly with 29.56% and 29.00% respectively compared to the lowest rate of 17.22%.

| Transactions | Rate F | B0 | B1 | B2 | B3 | Rate F | B0 | B1 | B2 | B3 |
|--------------|--------|----|----|----|----|---------|----|----|----|----|
| B0           | 17.22  | 18.43| 17.62| 19.05| 18.54| 20.49    | 21.63| 22.95| 24.20| 25.46|
| B1           | 17.62  | 18.78| 19.05| 19.42| 19.80| 20.95    | 22.25| 23.55| 24.80| 26.06|
| B2           | 18.43  | 19.78| 20.15| 20.52| 20.90| 21.95    | 23.25| 24.55| 25.80| 27.06|
| B3           | 17.22  | 18.51| 19.05| 19.42| 19.80| 20.95    | 22.25| 23.55| 24.80| 26.06|
The results of Table (9) showed that the spraying of the nutritious solution had a significant effect on the ratio between the carbohydrates and the nitrogen in the branches. The treatment of F_3 recorded a significant superiority on all the treatments, which reached 10.35% compared to F_0 which gave the lowest percentage of 8.14%. As for organic fertilizer spraying, it had a significant effect on the content of the leaves of nitrogen. Treatment B_3 recorded the highest rate of 9.08% compared with B_0, which gave the lowest percentage of 8.69%. As for the interaction between the treatments, it had a significant effect. F_3B_1 recorded the highest percentage of 10.45% compared with F_0B_0, which gave the lowest value of 8.02%.

Table (9) Effect of spraying with nutrient solution and organic fertilizer in the C/N Ratio (%).

| Rate | F   | B_1 | B_2 | B_3 | B_0 | Transactions |
|------|-----|-----|-----|-----|-----|--------------|
| 8.14 | 8.18| 8.29| 8.07| 8.02|     | F_0          |
| 8.20 | 8.32| 8.25| 8.19| 8.05|     | F_1          |
| 8.99 | 9.57| 9.27| 8.75| 8.39|     | F_2          |
| 10.35| 10.26|10.40|10.45|10.30|     | F_3          |
|      | 9.08| 9.05| 8.87| 8.69|     | Rate B       |

| LSD 5% | F×B | B | F |
|--------|-----|---|---|
| 0.56   | 0.29| 0.27|

4. Conclusion

The spraying of nutrient solution and organic fertilizer has led to a significant increase in the content of the branches of carbohydrates and nitrogen may be due to the role of large and minor elements contained in the solvents, and the increase in the length of branches and leaf area is also due to the role of phosphorus in the process of division of cells and the increase of forests, To increase root growth and provide the energy needed to absorb nutrients from the soil, increasing the amount of carbohydrates manufactured in the leaves and stored in branches (27). The increase in carbohydrate in the branches and the N / C ratio may be due to the effect of potassium in increasing the area of the paper and thus improving photosynthesis products leading to increased carbohydrates (28). In addition to the role of potassium in the translocation of carbohydrates from leaves to branches (29).

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