



Effect of populist plant bud extract, cytokinin and copper sulfate on some fruit traits and yield of fig trees, cultivar Aswood Diyala (*Ficus carica* L.)

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Abstract:

This study was conducted in one of the private orchards in Babylon province for the season 2020- in which 54 fig trees of homogeneous size and growth strength were selected and planted at distances (5 x 5 m). The experiment is implemented by (R.C.B.D) and with three replicates of cytokinin were (0, 100, 200 mg.L⁻¹) and populist s extract (0, 10, 20) g . L⁻¹, and CuSo4 (0, 2) g . L⁻¹. The use of the study factors alone or in combination led to a significant increase in all the studied traits, and the best results were obtained when using (western extract 20 g / L and cytokinin 200 mg / l copper sulfate 2 g / L) in traits of (fruit weight - fruit size Fruit length - total yield and the averages were (33.84 g , 32.10 cm , 3.77 cm ,27.94 kg) compared to the lowest average when compared, and it was (28.70 g , 26.17 cm , 2.86 cm ,20.53 kg).

Keywords: populist plant bud, , cytokinin, copper sulfate, fruit traits, fig trees, cultivar Aswood Diyala, *Ficus carica* L.

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increase the expansion and division of cells and increase the thickness of the cell wall, which helps reduce total loss and spoilage as well as its role in reducing ethylene. The Euphrates poplar plant contains a high percentage of salicin, which has an important role in stimulating the growth of plants and inhibiting the growth of bacteria and fungi that infect them and that the newly opened buds contain three times more phenolic compounds that inhibit the growth of microorganisms and ⁴ indicated that the salicin compound works to protect plants from some biological diseases caused by fungi and bacteria and improve their growth. Copper sulfate is also used as anti-bacterial and anti-fungal, as well as its role as nutritional element.

2. Materials and Methods

The study included 18 treatments and each treatment was repeated three times (each unit tree was considered experimental), the experiment was implemented as a factorial experiment and the Randomized Complete Block Design (R.C.B.D) was chosen with three factors and three replicates (3 x 3 x 2).The replicate is one tree, where the levels of cytokinin (0, 100, 200) Mg.L⁻¹, populist extract (0, 10, 20) g . L⁻¹, and copper

1. Introduction

The fig (*Ficus carica* L.) is a deciduous fruit tree belonging to the Moraceae family, It is believed that its original country is the south of the Arabian Peninsula, and there are still wild forests from it ¹. The Aswood Diyala fig cultivar is one of the local cultivars widely spread in the central region of Iraq, which farmers prefer to grow over the rest of the cultivars due to its abundant production and desirable taste for consumers, in addition to the medium size of the tree and the large and dense leaf area that protects the fruits from sunstroke in the summer months ²The cytokinins have different functions within the plant. They work to increase the expansion and division of cells and increase the thickness of the cell wall, which helps reduce total loss and spoilage as well as its role in reducing ethylene. The Aswood Diyala fig cultivar is one of the local cultivars widely spread in the central region of Iraq, which farmers prefer to grow over the rest of the cultivars due to its abundant production and desirable taste for consumers, in addition to the medium size of the tree and the large and dense leaf area that protects the fruits from sunstroke in the summer months ³, The cytokinins have different functions within the plant. They work to

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first on 3/24/ and the second on 04/24/ and the third on 5/24/2020, where the trees were sprayed until completely wetness, and dishwashing liquid was added as a diffuser The following traits were measured

The following traits were measured:

1- Average weight of the fruit

2- average fruit size

3-Average fruit length

4- The average of total production of trees

. The treatments were as follows:-

. The control was sprayed with distilled water

Copper sulfate 2 g/L + 0 Populist extract + 0 Paisen .

. Copper sulfate 0 + g / L 10 populist s extract + 0 Paisen

. Copper sulfate 2 g/L + 10 g/L Populist extract + 0 Paisen

. Copper sulfate 0 + g / L 20 populist extract + 0 Paisen

+ Copper sulfate 2 g / L. 20 g/L Western Blossom Extract + 0 Paisen

Copper sulfate 0. + 0 Western Blossom Extract + mg/L 100 Paisen

. Copper sulfate 2 g/L + 0 populist extract + mg/L 100 Paisen

. Copper sulfate 0 + g / L 10 populist extract + mg / L 100 Paisen

. Copper sulfate 2 g/L + 10 g/L Populist extract + mg/L 100 Paisen

. Copper sulfate 0 + g / l 20 populist extract + mg / L 100 Paisen

. Copper sulfate 2 g/L + 20 g/L Populist extract + mg/L 100 Paisen

Copper sulphate 0+0 Populist extract+ mg/L 200 Paisen .

. Copper sulfate 2 g/L + 0 Populist extract + mg/L 200 Paisen

. Copper sulfate 0 + g / l 10 populist extract + mg / L 200 Paisen

. Copper sulfate 2 g/L + 10 g/L Populist extract + mg/L 200 Paisen

Copper sulfate 0 + g/L 20 populist extract + mg/L 200 Paisen

. Copper sulfate 2 g/L + 20 g/L Populist extract + mg/L 200 Paisen

g, and the lowest was when the control treatment amounted to 28.70 g for the two seasons of the study, respectively.

2- The average fruit size(cm³):

The results in Table (2) show that the cytokinin treatments with their three concentrations caused an increase in fruit size compared to the control treatment. 27.01 cm³. Also, spraying populist extract had a significant effect on the average fruit size, and the highest result was at the concentration of 20 g / L, and the highest average was 30.35 cm³ compared to the control treatment, which recorded the lowest average of fruit size of 28.62 cm³ We also see from the table data that spraying copper sulfate has a significant effect on increasing the weight of the fruit, as we notice the highest result when using the concentration of 2 g / L and it was 29.61 cm³ While the lowest average for the control treatment amounted to 27.28 cm³ both season We also find that the triple interaction was significant for the study factors .The highest concentrations of the three factors excelled by giving the highest average for the volume of the eight, which amounted to 32.10 cm³

sulfate (0, 2) g . L⁻¹ spraying on the vegetative in three periods. Then the results were analyzed according to the analysis of the variance table and the averages were compared using the L.S.D test at a probability level of 5%⁵ The experiment was conducted in three sprays, the

3. Results and Discussion

1- Average weight of the fruit (g):

We see from the data in Table (1) that the treatment of fig trees of the Aswood Diyala cultivar with different concentrations of cytokinin had a significant effect on increasing the weight of the fruit. and that the highest result was obtained when using the concentration 200 mg / L, and the highest average was 32.81 g, while the lowest average was when the control treatment was 29.88 g. Also, spraying populist extract had a significant effect on the average fruit weight, and the highest result was at the concentration of 20 g / L and the highest average was 32.05 g compared to the control treatment, which recorded the lowest average fruit weight of 30.70 g As we can see from the table data that spraying copper sulfate has a significant effect on increasing the weight of the fruit. As we notice the highest result when using the concentration used 2 g / L and it was 31.58 g, while the lowest rates when using the control treatment amounted to 29.88 g .The interaction between the three study factors was significant, and the highest results were recorded at the highest levels used, where the weight of the fruit reached 33.84

erage, which amounted to 26.17 cm³ for both seasons. , while the control treatment recorded the lowest av-

Table (1) Effect of spraying cytokines of populist extract and copper sulfate on the average weight of the fruit(g)

| | | | treatments | |
|-----------------|----------------|----------------|----------------|----------------|
| interaction A*B | C | | B | A |
| | C ₂ | C ₁ | | |
| A ₁ | 29.30 | 28.70 | B ₁ | A ₁ |
| | 30.14 | 30.06 | B ₂ | |
| | 30.63 | 30.13 | B ₃ | |
| A ₂ | 31.43 | 31.10 | B ₁ | A ₂ |
| | 31.68 | 31.46 | B ₂ | |
| | 32.35 | 32.07 | B ₃ | |
| A ₃ | 32.72 | 30.95 | B ₁ | A ₃ |
| | 33.09 | 32.90 | B ₂ | |
| | 33.84 | 33.38 | B ₃ | |
| 1.379 | 1.950 | | LSD | |
| A effect | 31.58 | | 30.34 | |
| | 0.650 | | LSD | |
| interaction A*C | 29.69 | | 30.07 | |
| | 31.82 | | 31.54 | |
| | 33.22 | | 32.41 | |
| 0.796 | 1.126 | | LSD | |
| B effect | | | | |
| interaction B*C | 31.15 | | 30.25 | |
| | 31.64 | | 31.61 | |
| | 31.94 | | 32.16 | |
| 1.672 | 2.365 | | LSD | |

Table (2) Effect of spraying cytokines of populist extract and copper sulfate on average fruit size cm³

| | | | Treatments | |
|-----------------|----------------|----------------|----------------|-----------------|
| interaction A*B | C | | B | A |
| | C ₂ | C ₁ | | |
| 26.30 | 26.43 | 26.17 | B ₁ | A ₁ |
| 26.90 | 27.04 | 26.77 | B ₂ | |
| 27.84 | 28.10 | 27.57 | B ₃ | |
| 27.73 | 27.70 | 27.75 | B ₁ | A ₂ |
| 29.02 | 29.27 | 28.77 | B ₂ | |
| 30.39 | 30.70 | 30.09 | B ₃ | |
| 31.84 | 31.89 | 31.79 | B ₁ | A ₃ |
| 32.19 | 32.26 | 32.12 | B ₂ | |
| 31.82 | 32.10 | 31.54 | B ₃ | |
| 2.028 | 3.153 | | LSD | |
| effect A | 29.61 | | 27.28 | |
| | 0.484 | | LSD | |
| 27.01 | 27.19 | 26.84 | A ₁ | interaction A*C |
| 29.05 | 29.22 | 28.87 | A ₂ | |
| 31.28 | 31.42 | 31.15 | A ₃ | |
| 1.232 | 0.839 | | LSD | |
| effect | | | | |



| | | | | |
|-------|-------|-------|----------------|--------------------|
| B | | | | |
| 28.62 | 28.67 | 28.57 | B ₁ | interaction B*C |
| 29.37 | 29.52 | 29.22 | B ₂ | |
| 30.35 | 30.63 | 30.07 | B ₃ | |
| 1.232 | 1.039 | | LSD | |

4- The average total production of trees.

The results in Table (4) show that spraying fig trees with different concentrations of cytokinin had a significant effect on increasing the productivity of the treated trees, where the highest production rate at the concentration was 200 mg / L and reached 25.88 kg compared to the lowest production average when the control treatment was 20.29 kg . The spraying of populist extract had a significant effect on increasing the total production of trees, and the highest rates were when using the concentration of 20 g / L, recording 24.20 kg. While the lowest results were recorded when the control treatment, which recorded 23.81 kg, the use of copper sulfate also had a significant effect on this trait, and the highest result recorded was 24.43 kg at the concentration used 2 g / L compared to the control treatment, which recorded the lowest average and reached about 20.91 kg. We also note that the interaction between cytokinin and populist extract and copper sulfate had a significant effect on increasing the total production of trees. The highest result of the interaction was when using concentrations of 200 mg/L of cytokinin, 20 g/L of populist extract, and copper sulfate concentration of 2 g/L, and the productivity reached about 27.94 kg compared to the lowest rate when compared to the control treatment, which was 20.53 kg for both season.

average fruit length (cm) :-

The results in Table (3) that spraying fig trees with different concentrations of cytokinin had a significant effect on the length of the fruit at maturity, where the highest average of fruit length at the concentration was 200 mg / L and was 3.51 cm compared to the lowest average when the control treatment amounted to 3.119 cm .Also, spraying populist extract significantly affected the average fruit length, and the highest results were when using the concentration of 20 g / L, recording 3.47 cm. While the lowest results were recorded when the control treatment, which recorded 3.11 cm. Also, the use of copper sulfate had a significant effect in increasing the fruits length and the highest result recorded was 3.428 cm at the concentration used 2 g / L compared to the control treatment, which had an average fruit length of about 3.253 cm. We also find that the interaction between cytokinin and populist extract and copper sulfate had a significant effect on the fruit length and was the highest result of the interaction when using concentrations of 200 mg /L of cytokinin and 20 g /L of populist extract. The concentration of copper sulfate was 2 g/L, and the average fruit length was about 3.77 cm, compared to the lowest average when the control treatment, in which the average fruit length was 2.86 cm 2 for the two study seasons, respectively.

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Table (3) Effect of spraying cytokinin, populist extract and copper sulfate on the average fruit length

| First season | | | Treatments | |
|--------------------|----------------|----------------|----------------|----------------|
| interaction A*B | C | C ₁ | B | A |
| | C ₂ | | | |
| 3.090 | 3.313 | 2.867 | B ₁ | A ₁ |
| 3.398 | 3.350 | 3.447 | B ₂ | |
| 3.468 | 3.513 | 3.423 | B ₃ | |
| 3.282 | 3.283 | 3.280 | B ₁ | A ₂ |
| 3.342 | 3.383 | 3.300 | B ₂ | |
| 3.400 | 3.503 | 3.297 | B ₃ | |
| 3.465 | 3.403 | 3.527 | B ₁ | A ₃ |
| 3.525 | 3.533 | 3.517 | B ₂ | |



| | | | | |
|----------|--------|-------|----------------|--------------------|
| 3.647 | 3.773 | 3.520 | B ₃ | |
| 0.2118 | 0.2995 | | LSD | |
| A Effect | 3.428 | 3.253 | C Effect | |
| | 0.0998 | | LSD | |
| 3.119 | 3.224 | 3.013 | A ₁ | interaction A*C |
| 3.341 | 3.362 | 3.320 | A ₂ | |
| 3.512 | 3.527 | 3.498 | A ₃ | |
| 0.1223 | 0.1729 | | LSD | |
| B Effect | | | | |
| 3.179 | 3.333 | 3.024 | B ₁ | interaction B*C |
| 3.422 | 3.422 | 3.421 | B ₂ | |
| 3.472 | 3.530 | 3.413 | B ₃ | |
| 0.1223 | 0.1729 | | LSD | |

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Table (4) Effect of spraying cytokinin, populist extract and copper sulfate on the total production average of trees. kg/tree

| second season | | | Treatments | |
|--------------------|----------------|----------------|----------------|--------------------|
| interaction A*B | C | | B | A |
| | C ₂ | C ₁ | | |
| 20.952 | 21.370 | 20.533 | B ₁ | A ₁ |
| 22.437 | 22.507 | 22.367 | B ₂ | |
| 23.510 | 23.140 | 23.880 | B ₃ | |
| 23.813 | 24.090 | 23.537 | B ₁ | A ₂ |
| 24.772 | 25.007 | 24.537 | B ₂ | |
| 24.935 | 25.187 | 24.683 | B ₃ | |
| 24.883 | 25.770 | 23.997 | B ₁ | A ₃ |
| 25.890 | 25.933 | 25.850 | B ₂ | |
| 25.892 | 27.947 | 23.830 | B ₃ | |
| 0.7803 | 1.1035 | | LSD | |
| A Effect | 24.439 | 20.913 | C Effect | |
| | 0.3678 | | LSD | |
| 20.989 | 21.319 | 12.660 | A ₁ | interaction A*C |
| 24.340 | 24.428 | 24.252 | A ₂ | |
| 25.889 | 26.550 | 25.228 | A ₃ | |
| 0.4505 | 0.6371 | | LSD | |
| B Effect | | | | |
| 23.216 | 23.743 | 22.689 | B ₁ | interaction B*C |
| 23.47 | 24.149 | 24.251 | B ₂ | |
| 24.00 | 24.144 | 22.800 | B ₃ | |
| 0.4505 | 0.6371 | | LSD | |

drawal of nutrients and the increase in cell division and expansion, which is reflected in the increase in these traits ⁶ As for the increase in spraying western sprouts

Perhaps the reason for the increase in the average of weight, size and length of fruits and the total production of trees is due to the role of cytokinin in the with-



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extract, it is due to its role in increasing growth because it contains compounds related to an increase in total chlorophyll and plant hormones such as salicylic. Copper sulfate also has a role in the formation of enzymes that play in oxidation and reduction reactions in plants, It also enters the synthesis of phenols and lactase and is a necessary element in the formation of chlorophyll, and here it has an important role in increasing the photosynthesis process of trees and the manufacture of foodstuffs, and this is reflected positively in the increase in traits of the fruits as well as the total production⁷.

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