

## Effect of Cytokinin, Western bud extract and CuSo<sub>4</sub> on some Storage Traits of Fig Fruits of black Diyala cultivar. ( *Ficus carica* L. )

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### Abstract:

This study was conducted in one of the private orchards in Babylon province for the season 2021 - 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 factorial experiment with RCBD and with three replicates of cytokinin were 0, 100 and 200 mgL<sup>-1</sup> and western buds extract 0, 10 and 20 gL<sup>-1</sup> and CuSo<sub>4</sub> 0 and 2 gL<sup>-1</sup>.Storage experiment .It included the selection of a quantity of fruits at the beginning of maturity and the healthy fruits were selected from them and were placed in polyethylene bags perforated with 12 holes with a diameter of 5 mm at a rate of 1 kg of fruits in each bag for each treatment and then stored at a temperature of 5 ° C and relative humidity of 85 - 80% for 8 days After the storage period, the traits were measured. The results were analyzed using the same design method in the field experiment. The use of the study factors led to good results in the traits of the stored fruits after 8 days of storage Where the use of the study factors led to a reduction in the total spoilage of fruits, weight loss, and respiration rate, and total soluble solids (3.19% – 4.12% - 8.82 mg.co<sub>2</sub>/h 14.08 %), respectively, compared to the highest percentage of these traits and amounted to( 6.37 % , 10.58 % , 10.05 mg. co<sub>2</sub> /h , 16.96 % )

the characteristics of the fruit hardness, it was significantly affected by the spraying of cytokinin, extract and CuSo<sub>4</sub>.The highest results of fruit hardness and vitamin C were obtained when using the of the combined factors (200 Mg.L<sup>-1</sup> of cytokinin, 20 g/L of western extract, and 2 g/L of CuSo<sub>4</sub>), and the highest rates were for these two traits (0.34k.g/cm–6.96 %) and the lowest averages (0.28 k.g/cm 6.02%). when control treatment.

**Keywords:** Populist bud, Cytokinin, Fig, Storage.

## 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 (12). The Diyala black 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 (7). The 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 Diyala black 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 (4), The cytokinins have different functions within the plant. 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 (2) 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. The study aims to address some of the problems of Fig trees and improve the quality of the fruits.

## 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 The experiment is implemented by factorial experiment with 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<sup>-1</sup>, western bud extract (0, 10, 20) g L<sup>-1</sup>, and copper sulfate (0, 2) g L<sup>-1</sup> spraying on the vegetative in three periods. The following traits were measured.

Spray was conducted three times first 20/3 and the second 21/4 and third 22 / 5 2021.

The following traits were measured:

1- Percentage of weight loss: This percentage was calculated according to the following equation:

Weight loss percentage = (Weight of fruits at the beginning of storage - weight of fruits at the end of storage)/ Weight of fruits at the beginning of storage

2- Percentage of total spoilage: - Calculated according to the following equation:

Percentage of spoilage=
$$\frac{\text{Weight of spoilage fruits}}{\text{total weight}} \times 100$$

3- Respiration rate:

It was measured after 8 days of storage using the quantitative closed space method as mentioned in Shammari (13)

#### 4- Fruit hardness:-

Fruit hardness was measured. And with a plunger with a diameter of 0.5 cm and its units are kg / cm<sup>2</sup>.

5- vitamin C was measured after 8 days of storage (11)

#### 6- Total soluble solids percentage:

Total soluble solids in fruit juice for each treatment were estimated by Hand Refractometer

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 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.

## Results and Discussion

### 1- Percentage of weight loss (%):

The results in a table (1) that the Cytokinin spray had an effect on reducing weight loss, and the lowest results were recorded when using the concentration 200 Mg.L<sup>-1</sup>, and it was 3.60%, while the highest average of weight loss was when the control treatment recorded 6.43% We also note that the extract had a significant effect in reducing weight loss and that the lowest

average of weight loss was when using the concentration of 20 g L<sup>-1</sup>, and it was 4.11%, while the highest rate for this trait was when compared, which amounted to 6.77 %. We also see that copper sulfate spraying significantly reduced weight loss when using the concentration of 2 g.L<sup>-1</sup>, and it was 4.32%, while the highest average was when the control treatment was recorded, and it was 6.53 %.The triple interaction was significant in reducing weight loss, and the lowest results were when using the highest concentrations of the study factors, which recorded 3.19%, while the highest rates of weight loss were in the comparison, which recorded 6.37% after 8 days of storage at 5 °C.

### 2- Percentage of spoilage fruits:

Through the data in Table (2), we find that the spraying of Cytokinin had an effect in reducing the percentage of spoilage fruits, and the lowest results were when using the concentration of 200 Mg.L<sup>-1</sup> and it was 4.91%, while the highest rate was when the control treatment recorded 8.90%and we find that spraying western buds extract has a significant effect in reducing spoilage fruits, and that the lowest average was when using the concentration of 20 g. L<sup>-1</sup>, and it reached 6.27%, while the highest average for this trait was when compared, which amounted 7.68%.We also find that copper sulfate spraying has a significant effect in reducing spoilage fruits, whose percentage decreased 5.67% when spraying the concentration of 2 g . L<sup>-1</sup>, while the highest average was when the control treatment was recorded, and it was 10.16%. the triple interaction of the study factors was effective in reducing the

**Table (1) Effect of cytokinin, populist bud and CuSO<sub>4</sub> on Percentage of weight loss %**

| Interaction<br>A*B | Treatments<br>CuSO <sub>4</sub> |                | populist bud   | Cytokinin      |
|--------------------|---------------------------------|----------------|----------------|----------------|
|                    | C <sub>2</sub>                  | C <sub>1</sub> |                |                |
| 6.028              | 5.683                           | 6.373          | B <sub>1</sub> |                |
| 5.302              | 5.180                           | 5.423          | B <sub>2</sub> | A <sub>1</sub> |
| 4.962              | 4.870                           | 5.053          | B <sub>3</sub> |                |
| 4.442              | 4.373                           | 4.510          | B <sub>1</sub> |                |
| 4.248              | 4.230                           | 4.267          | B <sub>2</sub> | A <sub>2</sub> |
| 4.082              | 4.013                           | 4.150          | B <sub>3</sub> |                |
| 3.865              | 3.807                           | 3.923          | B <sub>1</sub> |                |
| 3.662              | 3.613                           | 3.710          | B <sub>2</sub> | A <sub>3</sub> |
| 3.293              | 3.193                           | 3.393          | B <sub>3</sub> |                |
| 0.1997             | 0.2825                          |                | LSD 0.05       |                |
| A                  | 4.329                           | 6.534          | C              |                |
|                    | 0.0942                          |                | LSD 0.05       |                |
| 6.431              | 5.244                           | 7.617          | A <sub>1</sub> |                |
| 4.257              | 4.206                           | 4.309          | A <sub>2</sub> | A*C            |
| 3.607              | 3.538                           | 3.676          | A <sub>3</sub> |                |
| 0.1153             | 0.1631                          |                | LSD 0.05       |                |
| B                  |                                 |                |                |                |
| 6.778              | 5.621                           | 7.936          | B <sub>1</sub> |                |
| 4.404              | 4.341                           | 4.467          | B <sub>2</sub> | B*C            |
| 4.112              | 4.026                           | 4.199          | B <sub>3</sub> |                |
| 0.1153             | 0.1631                          |                | LSD 0.05       |                |

copper sulfate spraying has a significant effect in reducing spoilage fruits, whose percentage decreased 5.67% when spraying the concentration of 2 g . L<sup>-1</sup>, while the highest average was when the control treatment was recorded, and it was 10.16% The triple interaction of the study factors was effective in reducing the percentage of spoilage fruits, and the lowest results were when using the highest concentrations of the study factors, which recorded 4.12%, while the highest rates of weight loss were when compared, which recorded 10.58 % after 8 days of storage and for both seasons

### 3- The fruits respiration

Through the data in Table (3), we find that the spraying of Cytokinin had an effect on reducing the respiration of the fruits, and the lowest respiration rate was when using the concentration 200 mg.L<sup>-1</sup>, and it reached 9.81 while the highest average was when the control treatment recorded 12.57 and we find that spraying western buds extract has a significant effect in reducing respiration, where the lowest rate was when using the concentration of 20 g.L<sup>-1</sup>, and it reached 10.91, while the highest average of respiration of fruits was when

**Table (2) Effect of cytokinin, populist bud and CuSO<sub>4</sub> on- Percentage of spoilage fruits %**

| interaction | Treatments |                |                | populist bud   | Cytokinin |
|-------------|------------|----------------|----------------|----------------|-----------|
|             | A*B        | C <sub>2</sub> | C <sub>1</sub> |                |           |
| 9.822       | 9.060      | 10.583         | B <sub>1</sub> |                |           |
| 8.557       | 8.483      | 8.630          | B <sub>2</sub> | A <sub>1</sub> |           |
| 8.345       | 8.260      | 8.430          | B <sub>3</sub> |                |           |
| 7.718       | 7.383      | 8.053          | B <sub>1</sub> |                |           |
| 6.903       | 6.613      | 7.193          | B <sub>2</sub> | A <sub>2</sub> |           |
| 6.183       | 6.040      | 6.327          | B <sub>3</sub> |                |           |
| 5.523       | 5.350      | 5.697          | B <sub>1</sub> |                |           |
| 4.932       | 4.800      | 5.063          | B <sub>2</sub> | A <sub>3</sub> |           |
| 4.300       | 4.120      | 4.480          | B <sub>3</sub> |                |           |
| 0.2645      |            | 0.3741         | LSD 0.05       |                |           |
|             | 5.679      | 10.162         | C              |                |           |
| A           |            | 0.1247         | LSD 0.05       |                |           |
| 8.908       | 8.601      | 9.214          | A <sub>1</sub> |                |           |
| 6.935       | 6.679      | 7.191          | A <sub>2</sub> | A*C            |           |
| 4.918       | 4.757      | 5.080          | A <sub>3</sub> |                |           |
| 0.1527      |            | 0.2160         | LSD 0.05       |                |           |
| B           |            |                |                |                |           |
| 7.688       | 7.264      | 8.111          | B <sub>1</sub> |                |           |
| 6.797       | 6.632      | 6.962          | B <sub>2</sub> | B*C            |           |
| 6.276       | 6.140      | 6.412          | B <sub>3</sub> |                |           |
| 0.1527      |            | 0.2160         | LSD 0.05       |                |           |

Compared, which amounted to 11.91. We also find that copper sulfate spraying has no significant effect on respiration average. The triple interaction of the study factors was effective in reducing the respiration rate, and the lowest results were when using the highest concentrations of the study factors, which recorded 8.82, while the highest averages of weight loss were when the comparison recorded 13.05. The cytokinins in increasing the thickness of cells, which allows to reduce moisture loss, increase the resistance of the outer shell of fruits and reduce the respiration rate of fruits, which in turn increases the spoilage

of fruits as well as the role of cytokines in increasing the firmness of the fruits (1). The extract also has a role in reducing the percentage of total spoilage, weight loss, and rapid respiration of the fruits at the end of the storage period because the extract contains a percentage of many phenolic compounds, the most important of which is salicylic acid, which works to reduce the level of ethylene and thus reduces respiration and spoilage of fruits (8). The reason for reducing the percentage of spoilage, weight loss and respiration as a result of using CuSO<sub>4</sub> is due to the role of sulfur in resisting fungal diseases that

increase the rate of fruit spoilage, as well as increasing plant resistance to diseases and enhancing the protective role. Copper

is also important to increase the resistance of fruit trees to fungi (6)

**Table (3) Effect of cytokinin, populist bud and CuSO<sub>4</sub> on The fruits respiration (mg .co<sub>2</sub>/h)**

| Interaction<br>A*B | Treatments     |                   |                | populist bud   | Cytokinin      |
|--------------------|----------------|-------------------|----------------|----------------|----------------|
|                    | C <sub>2</sub> | CuSO <sub>4</sub> | C <sub>1</sub> |                |                |
| 12.828             | 12.607         |                   | 13.050         | B <sub>1</sub> |                |
| 12.495             | 12.473         |                   | 12.517         | B <sub>2</sub> | A <sub>1</sub> |
| 12.388             | 12.357         |                   | 12.420         | B <sub>3</sub> |                |
| 12.322             | 12.303         |                   | 12.340         | B <sub>1</sub> |                |
| 11.912             | 11.770         |                   | 12.053         | B <sub>2</sub> | A <sub>2</sub> |
| 11.365             | 11.263         |                   | 11.467         | B <sub>3</sub> |                |
| 10.583             | 10.463         |                   | 10.703         | B <sub>1</sub> |                |
| 9.872              | 9.590          |                   | 10.153         | B <sub>2</sub> | A <sub>3</sub> |
| 8.996              | 8.828          |                   | 9.163          | B <sub>3</sub> |                |
| 0.2231             |                | 0.3155            |                | LSD 0.05       |                |
| A                  | 11.495         |                   | 11.541         | C              |                |
|                    |                | 0.1052            |                | LSD 0.05       |                |
| 12.571             | 12.479         |                   | 12.662         | A <sub>1</sub> |                |
| 11.866             | 11.779         |                   | 11.953         | A <sub>2</sub> | A*C            |
| 9.817              | 9.627          |                   | 10.007         | A <sub>3</sub> |                |
| 0.1288             |                | 0.1822            |                | LSD 0.05       |                |
| B                  |                |                   |                |                |                |
| 11.911             | 11.791         |                   | 12.031         | B <sub>1</sub> |                |
| 11.426             | 11.278         |                   | 11.574         | B <sub>2</sub> | B*C            |
| 10.916             | 10.816         |                   | 11.017         | B <sub>3</sub> |                |
| 0.1288             |                | 0.1822            |                | LSD 0.05       |                |

#### 4-Fruit hardness:

The data in Table (4) found of Cytokinin has effect on increasing the hardness of the fruits by using 200 mg.L<sup>-1</sup> and it amounted to 0.330 Compared with the lowest results, when the control was recorded, which was recorded at 0.312, as well as the effect of the use of western extract significantly in increasing the firmness of the fruit of 20 g. L<sup>-1</sup>, which gave 0.322, and the lowest

results. the control to 0.316. It is also evident from the results of the table that spraying CuSO<sub>4</sub> has a significant increase in fruit hardness, and the highest rate of fruit hardness 0.329 compared to the control treatment, which recorded 0.319. Also, the interaction between the study factors the interaction by using the and reached 0.340 and the lowest rate was when the comparison treatment which gave 0.280.

**Table (4) Effect of cytokinin , populist bud and CuSO<sub>4</sub> on Fruit hardness at the end of the storage period (Kg .cm)**

| interaction<br>A*B | Treatments<br>CuSO <sub>4</sub> |                | populist bud   | Cytokinin      |
|--------------------|---------------------------------|----------------|----------------|----------------|
|                    | C <sub>2</sub>                  | C <sub>1</sub> |                |                |
| 0.2972             | 0.3167                          | 0.2807         | B <sub>1</sub> |                |
| 0.3242             | 0.3293                          | 0.3190         | B <sub>2</sub> | A <sub>1</sub> |
| 0.3197             | 0.3183                          | 0.3210         | B <sub>3</sub> |                |
| 0.3358             | 0.3303                          | 0.3413         | B <sub>1</sub> |                |
| 0.3262             | 0.3270                          | 0.3253         | B <sub>2</sub> | A <sub>2</sub> |
| 0.3192             | 0.3140                          | 0.3243         | B <sub>3</sub> |                |
| 0.3207             | 0.3230                          | 0.3183         | B <sub>1</sub> |                |
| 0.3408             | 0.3457                          | 0.3360         | B <sub>2</sub> | A <sub>3</sub> |
| 0.3287             | 0.3400                          | 0.3173         | B <sub>3</sub> |                |
| 0.03049            | 0.04313                         |                | LSD 0.05       |                |
|                    | 0.3291                          | 0.3193         | C              |                |
| A                  | 0.01438                         |                | LSD 0.05       |                |
| 0.3125             | 0.3214                          | 0.3036         | A <sub>1</sub> |                |
| 0.3271             | 0.3238                          | 0.3303         | A <sub>2</sub> | A*C            |
| 0.3301             | 0.3362                          | 0.3239         | A <sub>3</sub> |                |
| 0.01761            | 0.02490                         |                | LSD 0.05       |                |
| B                  |                                 |                |                |                |
| 0.3167             | 0.3233                          | 0.3101         | B <sub>1</sub> |                |
| 0.3304             | 0.3340                          | 0.3268         | B <sub>2</sub> | B*C            |
| 0.3225             | 0.3241                          | 0.3209         | B <sub>3</sub> |                |
| 0.01761            | 0.02490                         |                | LSD 0.05       |                |

## 5- vitamin C:

The data in Table (4) found of Cytokinin has effect on increasing the vitamin C by using 200 mg.L<sup>-1</sup> and it amounted to 6.49 %-Compared with the lowest results, when the control was recorded, which was recorded at 6.18 %-, as well as the effect of the use of western extract significantly in increasing the vitamin C of 20 g . L<sup>-1</sup>L, which gave -% 6.52, and the lowest results

n the control to - 6.44.%. It is also evident from the results of the table that spraying CuSo<sub>4</sub> has a significant increase in vitamin C, and the highest rate of vitamin 6.51% compared to the control treatment, which recorded 6.19 %.Also, the interaction between the study factors the interaction by using the and reached 6.96%-and the lowest rate was when the comparison treatment which gave 6.02%.

**Table (5) Effect of cytokinin , populist bud and CuSO<sub>4</sub> on vitamin C %**

| interaction | Treatment |                                     |                | populist bud   | cytokinin |
|-------------|-----------|-------------------------------------|----------------|----------------|-----------|
|             | A*B       | CuSO <sub>4</sub><br>C <sub>2</sub> | C <sub>1</sub> |                |           |
| 6.124       | 6.226     | 6.022                               | B <sub>1</sub> |                |           |
| 6.495       | 6.480     | 6.510                               | B <sub>2</sub> | A <sub>1</sub> |           |
| 6.473       | 6.440     | 6.507                               | B <sub>3</sub> |                |           |
| 6.473       | 6.587     | 6.360                               | B <sub>1</sub> |                |           |
| 6.292       | 6.257     | 6.327                               | B <sub>2</sub> | A <sub>2</sub> |           |
| 6.415       | 6.397     | 6.433                               | B <sub>3</sub> |                |           |
| 6.378       | 6.403     | 6.353                               | B <sub>1</sub> |                |           |
| 6.413       | 6.477     | 6.350                               | B <sub>2</sub> | A <sub>3</sub> |           |
| 6.887       | 6.967     | 6.807                               | B <sub>3</sub> |                |           |
| 0.3238      | 0.4579    |                                     | LSD 0.05       |                |           |
| A           | 6.519     | 6.193                               | C              |                |           |
|             | 0.1526    |                                     | LSD 0.05       |                |           |
| 6.182       | 6.361     | 6.002                               | A <sub>1</sub> |                |           |
| 6.393       | 6.413     | 6.373                               | A <sub>2</sub> | A*C            |           |
| 6.493       | 6.582     | 6.403                               | A <sub>3</sub> |                |           |
| 0.1869      | 0.2644    |                                     | LSD 0.05       |                |           |
| B           |           |                                     |                |                |           |
| 6.443       | 6.584     | 6.301                               | B <sub>1</sub> |                |           |
| 6.400       | 6.404     | 6.396                               | B <sub>2</sub> | B*C            |           |
| 6.525       | 6.568     | 6.482                               | B <sub>3</sub> |                |           |
| 0.1869      | 0.2644    |                                     | LSD 0.05       |                |           |

6- Percentage of total soluble solids at the end of storage:

Through the data in Table (6) we find that the spraying of cytokinin had an effect on lowest the percentage of total soluble solids at the end of the storage period, and the highest results were when using the concentration of 200 mg.L<sup>-1</sup> and it was 14.46 %As for the increasing average in the control treatment, which recorded 16.45%, we find that spraying western bud extract has a significant effect in increasing this percentage, and the increasing average was when using the concentration 20 g.L<sup>-1</sup> and it reached 14.10 %. The lowest

average for this trait was in The control, which amounted to 15.66%.We also find that copper sulfate spraying had a significant effect increasing the percentage of total soluble solids, which reached when spraying the concentration of 2 g.L<sup>-1</sup>, while the lowest rate was when the control treatment recorded 14.3015.43%.The triple interaction of the study factors was effective in increasing the percentage, and the highest results were when using the highest concentrations of the study factors, which recorded 14.08 %While the increasing average of weight loss was when compared, which recorded 16.96 % .

**Table (6) Effect of cytokinin, populist bud and CuSO<sub>4</sub> on Percentage of total soluble solids at the end of storage %**

| interaction | Treatment |                |                | populist bud   | cytokinin |
|-------------|-----------|----------------|----------------|----------------|-----------|
|             | A*B       | C <sub>2</sub> | C <sub>1</sub> |                |           |
| 16.78       | 16.59     | 16.96          | B <sub>1</sub> |                |           |
| 15.79       | 15.82     | 15.77          | B <sub>2</sub> | A <sub>1</sub> |           |
| 15.29       | 15.07     | 15.52          | B <sub>3</sub> |                |           |
| 15.23       | 15.10     | 15.36          | B <sub>1</sub> |                |           |
| 15.27       | 15.36     | 15.17          | B <sub>2</sub> | A <sub>2</sub> |           |
| 15.00       | 14.79     | 15.21          | B <sub>3</sub> |                |           |
| 14.99       | 14.91     | 15.08          | B <sub>1</sub> |                |           |
| 14.95       | 14.87     | 15.03          | B <sub>2</sub> | A <sub>3</sub> |           |
| 14.50       | 14.08     | 14.91          | B <sub>3</sub> |                |           |
| 0.826       | 1.1681    |                | LSD 0.05       |                |           |
| A           | 14.305    | 15.439         | C              |                |           |
|             | 0.3894    |                | LSD 0.05       |                |           |
| 16.45       | 16.82     | 16.08          | A <sub>1</sub> |                |           |
| 15.16       | 15.08     | 15.25          | A <sub>2</sub> | A*C            |           |
| 14.46       | 14.00     | 14.92          | A <sub>3</sub> |                |           |
| 0.4769      | 0.6744    |                | LSD 0.05       |                |           |
| B           |           |                |                |                |           |
| 15.66       | 15.53     | 15.80          | B <sub>1</sub> |                |           |
| 15.34       | 15.35     | 15.32          | B <sub>2</sub> | B*C            |           |
| 14.10       | 14.08     | 15.12          | B <sub>3</sub> |                |           |
| 0.4769      | 0.6744    |                | LSD 0.05       |                |           |

The reason for the increase in hardness of Cytokinins also have a role in preventing protein breakdown, water absorption, production of sugars, increasing cell wall flexibility, and DNA synthesis and the division of the cytoplasm. In addition to the previous functions, cytokinin has a role in the withdrawal of elements. It is considered a mechanism of Sinks in the side buds, including hormones, vitamins, and mineral elements (9). As for the reason for the increase in the aforementioned qualities as a result of spraying western bud extract, it may be due to the extract's

content of effective, which increase cell division and widening, thus allowing the withdrawal of an amount of these compounds. It also has an effective role in increasing the Indole acetic acid compound, which causes an increase in the elasticity and plasticity of the cell wall, allowing its expansion and the withdrawal of quantities of water (10). The reason for the increase in fruit hardness and total soluble solids as a result of CuSO<sub>4</sub> spraying. The role of these two elements has direct effects on plant growth. And the transfer of electrons, where sulfur plays a

role in building chlorophyll, thus increasing the manufactured materials that are transmitted from the leaves As well as the role of copper in the representation of proteins, preventing the death of modern growth and activating the enzyme tree(3).

### Conflict of interest

The authors have no conflict of interest.

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