Response of Two variety of Snake Cucumber to Spray with Atonics Biostimulator in Some Chemical Parameters

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Abstract

The experiment was carried out in unheated greenhouses in the station of the College of Agriculture and Marshes / Dhi Qar University during the fall season 2020-2021, to study the effect of atonic biostimulant in chemical parameters growth and yield of snak cucumber (Cucumis melo. Var flexuosus naud) under protected cultivation,. The experiment included two factors: First one two cultivars of cucumber (Al-Baghdadi and Al-Halawi),second factor was atonic biostimulant (0, 0.5, 1.5 ml L⁻¹) A Randomized Complete Block Design (R.C.B.D.) were used with three replicates and means were compared according to Least Significant Difference Test (L.S.D.)test at probability of 0.05. Determining the stages of plant growth in which the foliar spraying process was carried out and the number of sprays. Results were summarized as follows:

Al-Baghdadi cultivar was significantly superior in (content of total soluble carbohydrates in fruits, vitamin (C) and total chlorophyll content of fruits), reached (6.181, 101.8 and 9.744) mg 100 g⁻¹ respectively Compare with Al-Halawi cultivar which recorded the highest rate of protein in fruits(145.0 mg 100 g⁻¹), The addition of atonic spray treatment at a concentration 1.5 ml L⁻¹ was significantly in (content of total soluble carbohydrates in fruits, vitamin (C), total chlorophyll and proteins in fruits), which recorded (7.372 mg 100g⁻¹ and 132.5 mg 100g⁻¹ and 10,860 mg 100g⁻¹ and 4.323%) respectively, but the control treatment gave the lowest rates, the interaction between Al-Baghdadi cultivar and 1.5 mL⁻¹ atonic biostimulator was superior (content of total soluble carbohydrates, vitamin (C), total chlorophyll content in fruits), 145.0 mg 100 g⁻¹, 11.019 mg 100 g⁻¹ and 4.354%) respectively, but the comparison treatment gave the lowest rates.

Keywords: Alqthae, Atonics, Proteins, Chlorophyll.

1. Introduction

Snake cucumber (Cucumis melo. Var flexuosus naud) one of the important summer vegetable crops in Iraq and the world. It belongs to Cucurbitaceae family. It is believed that the Mediterranean basin was original home. It is cultivated for the purpose that contain vitamin (A, B, C) in addition to calcium, phosphorous, elements. Iron, sulfur, oil, amino acids, protein, carbohydrates and fibers, and it has a strong cool taste[1]. Its fruits were used in pickles and salads Also, it is almost similar to a watermelon plant, except for the difference in the nature of flowers. It is a single-sex and single-dwelling. Cucumber is grown in Iraq in open fields with two seasons (spring and autumn) as well as It can be grown under plastic tunnels and greenhouses.

Plant productivity is low in Iraq due to environmental stress on plants, It is necessary to use modern technologies, including biostimulants, To reduce the harmful impact of environmental stress on plants and increases the ability of plants to absorb nutrients, so it is preferable to apply the tonic and spray [1, 2, 3]. The research aims at the possibility of using atonics that effect on the growth and yield of snak cucumber.

2. Materials and Methods

The experiment was carried out in greenhouses at the research station / College of Agriculture and the Marshes - University of Dhi Qar in Al-Mustafawiya area in the city of Nasiriyah during growing season 2020-2021, the purpose of studying the effect of foliar spraying with atonic on some vegetative traits and yield for two cultivars of snake cucumber (Baghdadi and Halawi). Studied traits: carbohydrate content according to the method of [7]. Vitamin C [6], chlorophyll content in fruits [8] and protein content in fruits [9]. All treatments were replicated 3 times for both cultivars. The experiment design in Randomized Complete Block Design (R.C.B.D.). Data were separated at a level of 0.05.
2.1 Estimation of the total soluble carbohydrate content in fruits (mg100g⁻¹)

The total soluble carbohydrates in the plant are estimated using the fourth true leaf, following the phenol-sulfuric acid method described by [7].

2.2 Vitamin C (%)

The content of vitamin (C) in the fruits is estimated by taking a weight of 20g from the middle parts of the fruits. This weight was cut into very small pieces and 40 ml of a mixture of metaphosphoric acid and acetic acid was added to it, and it was mixed in an electric mixer for (5) Minutes, then filter the juice, take (10) ml of it and wipe it with 2.6-Dichlorophenol indophenol dye as described in the [6]. Final readings were recorded in units of mg 100 g⁻¹ fresh weight.

2.3 Determination of the total chlorophyll content of fruits (mg 100g⁻¹)

Total chlorophyll was estimated by extracting chlorophyll from a specific weight of fresh leaves (1 g) and crushing it with (20 ml) of acetone (80%) and then placing it in a centrifuge at a speed of (1500 rpm), after which the light absorption was read. For the sample with a Spectrophotometer at two wavelengths 663 nm and 645 nm, the amount of chlorophyll (mg. L⁻¹) was then estimated through the following equation [8]:

\[
\text{Total Chlorophyll (mg/L)} = 20.2 \ D (645) + 8.02 \ D (663)
\]

* The unit (mg L⁻¹) is converted to (mg 100 g⁻¹) by the equation:

\[
\text{(mg 100 g}^{-1}) = \frac{\text{mg} \ L^{-1}}{1000 mL} \times \frac{100}{\text{sample weight (g)}}
\]

2.4 Estimation of the total protein content of fruits (%)

Dry and ground samples of fruit pulp were weighed in the amount of 0.2 g and digested according to the method of and the nitrogen element in the fruits was estimated according to the Micro-Kildhal method described in [9] Then the total protein in the fruit pulp is estimated on the basis of protein nitrogen by applying the following equation:

\[
\text{Percentage of proteins} = \text{Percentage of nitrogen} \times 6.25
\]

3. Results and Discussion

3.1 Total soluble carbohydrates content in fruits

Results of Table (1) showed that the Baghdadi cultivar was significantly superior higher rate of carbohydrates content in fruits (6.181 mg 100g⁻¹) compared with Al-Halawi cultivar, which recorded 5.999 mg 100g⁻¹. Also the same table shows that the atonic spray treatment had a significant effect, as the concentrations of 1.5 mL⁻¹ Significantly superior to the rest of the treatments.

The interaction between the study factors showed a significant effect, Baghdadi cultivar gave the highest rate (7.327 mg 100 g⁻¹) at a concentration of 1.5 mL⁻¹, while the comparison treatment for Halawi cultivar gave the lowest rate (4.913 mg 100 g⁻¹).

| Cultivar effect | Atonic concentration ml L⁻¹ | Average Cultivar |
|-----------------|-----------------------------|-----------------|
| Baghdadi        | 5.156 6.046 6.195 7.327     | 6.181           |
| Halawi          | 4.913 6.014 6.181 6.889     | 5.999           |
| Average atonic  | 5.034 6.03 6.188 7.108      |                 |
| L.S.D           | Cultivar 0.1717 Atonic 0.1521 Interference of cultivar and atonic 0.4162 |

3.2 Vitamin C

Results of table (2) showed the superiority of Baghdadi cultivar, which recorded a higher rate (101.8 mg 100 g⁻¹) compared with Halawi cultivar (88.3 mg 100 g⁻¹). The same table also shows that the atonic spray treatment had a significant effect, the concentrations 1.5 mL⁻¹ (132.5 mg 100g⁻¹) compared to the rest of treatments.
The interaction between the factors of the study showed a significant effect, as the interaction of Baghdadi cultivar gave the highest rate (145.0 mg 100 g⁻¹) at a concentration of 1.5 mL⁻¹, while the comparison treatment for Halawi cultivar gave the lowest rate (58.3 mg 100 g⁻¹).

### Table 2. Effect of spraying atonic and interferences in the percentage of vitamin C content in fruits (mg 100g⁻¹) of snake cucumber plant.

| Cultivar effect | Atonic concentration ml L⁻¹ | Average Cultivar |
|-----------------|-----------------------------|------------------|
|                 | 0  | 0.5 | 1  | 1.5 |         |
| Baghdadi        | 65.7 | 91.7 | 105.0 | 145.0 | 101.8 |
| Halawi          | 58.3 | 76.7 | 98.3 | 120.0 | 88.3  |
| Average atonic  | 62.0 | 84.2 | 101.7 | 132.5 |
| L.S.D           | Cultivar | Atonic | Interference of cultivar and atonic |
| 0.05            | 6.49 | 9.18 |         | 12.99 |

#### 3.3 The content of total chlorophyll (mg 100g⁻¹)

In table (3) showed that Baghdadi cultivar was significantly on chlorophyll content (9.744 mg 100 g⁻¹) compared with Al-Halawi cultivar (8.96 mg 100 g⁻¹). Atomic spray treatment had a significant at concentrations 1.5 mL⁻¹ (10.860 mg 100 g⁻¹) significantly superior to the rest of the treatments.

The interaction between the study factors showed a significant effect, as the interaction between the cultivar and the atomic spray had a significant effect, as Baghdadi cultivar gave the highest rate 11.019 mg 100 g⁻¹ at a concentration of 1.5 mL⁻¹, while the comparison treatment for Halawi cultivar gave the lowest rate (6.378 mg 100 g⁻¹).

### Table 3. Effect of spraying atonics and interferences in the total chlorophyll content of leaves (mg 100g⁻¹) of snake cucumber plant.

| Cultivar effect | Atonic concentration ml L⁻¹ | Average Cultivar |
|-----------------|-----------------------------|------------------|
|                 | 0  | 0.5 | 1  | 1.5 |         |
| Baghdadi        | 8.302 | 9.369 | 10.287 | 11.019 | 9.744 |
| Halawi          | 6.378 | 8.888 | 9.883 | 10.702 | 8.963 |
| Average atonic  | 7.340 | 9.128 | 10.085 | 10.860 |
| L.S.D           | Cultivar | Atonic | Interference of cultivar and atonic |
| 0.05            | 0.1619 | 0.2289 |         | 0.3237 |

#### 3.4 Protein content in leaves of fruits (%)

Results in table (4) showed that Halawi cultivar was significantly superior as compared with Baghdadi cultivar in protein content (4.115, 3.724%) Atomic spray treatment had a significant effect, as the two concentrations exceeded 1.5 mL⁻¹ significantly compared to the control treatment, which recorded (4.323 and 3.344) %, respectively.

The interaction between the cultivar and the atomic spray had a significant effect Halawi cultivar gave the highest rate (4.354%) at the concentration of 1.5 mL⁻¹, while the comparison treatment for Baghdadi cultivar gave lowest rate (3.146%).

### Table 4. Effect of spraying atonics and interferences in the protein content of leaves of fruits (%) of snake cucumber plant.

| Cultivar effect | Atonic concentration ml L⁻¹ | Average Cultivar |
|-----------------|-----------------------------|------------------|
|                 | 0  | 0.5 | 1  | 1.5 |         |
| Baghdadi        | 3.146 | 3.500 | 3.958 | 4.292 | 3.724 |
| Halawi          | 3.542 | 3.979 | 4.583 | 4.354 | 4.115 |
| Average atonic  | 3.344 | 3.740 | 4.271 | 4.323 |
| L.S.D           | Cultivar | Atonic | Interference of cultivar and atonic |
| 0.05            | 0.0806 | 0.1139 |         | 0.1611 |

Results showed that the effect of the cultivar and the concentrations of the atomic foliar spray treatment and their interactions significantly affected some content of total soluble carbohydrates, vitamin (C), chlorophyll and total proteins in the fruits. The variety differed among them in Tables (1, 2, 3 and 4) and the reason is due to the genetic factors of the cultivars and their response to environmental factors. This is agree with [4].

The reason for the increase in the content of chlorophyll in leaves as a result of treatment with a tononic biostimulator the reason may be increasing the nitrogen content in fruits as well as other nutrients, which caused an increase in construction of
chlorophyll pigment. And the chloroplasts contain more than half of the total nitrogen content [3, 12, 10], which reflects positively the role of these elements in the construction of chlorophyll pigment in leaves [11]. The reason for the increase in the carbohydrate content of fruits when treated with atonic biostimulator may be increasing the content of chlorophyll in leaves, and this in turn reflected positively on efficiency of the photosynthesis process as well as increase of manufactured materials in fruits. The increase in effectiveness of antioxidants. This result is consistent with [13], on atonic treatment on tomato plants. The reason for the increase in the protein content in the leaves may be due to the important role of nitrogen in increasing the activity of the enzyme nitrate reductase, which is important in the process of nitrogen metabolism. [14]. As well as the role of nitrogen in the process of forming proteins, through its effect on the formation of DNA RNA [15]. Results of the study were similar to what was found by [16] when spraying latonic on three cultivars of mulberry trees and with [13], which confirmed the superiority of the concentration 6 mg. L⁻¹ atonic in giving the highest value for proteins compared to the lowest concentrations.

The increase in the content of vitamin C in fruits may be due to the role of the atonic in activating the metabolic processes that lead to an increase in the level of glucose, which has an influential role in determining the level of ascorbic acid in the fruits. [17] mentioned that an increase in vitamin C is related to carbohydrate metabolism, and since nitrogen is an important factor in increasing the metabolism of carbohydrates, its presence is a stimulating factor for the formation of vitamin C. An increase in vitamin C plays an important role as an antioxidant, as it is the first line of defense and from The most powerful non-enzymatic antioxidant in the main cell components and the inhibitory force on cell membrane oxidation and has the ability to quench ROS and reduce hydrogen peroxide to water by ascorbate peroxides enzyme, whose effectiveness increased in fruits when treated with atonic [19]. This result is similar to what was obtained by [5] when using the atonic and with [18], they found that spraying atonic on strawberry plants caused a significant increase in the content of vitamin C for one of the cultivars, while it did not affect the other cultivar for two consecutive seasons.

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