Plant Archives Vol. 21, Supplement 1, 2021 pp. 1062-1065 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
doi link : https://doi.org/10.51470/PLANTARCHIVES.2021.v21.S1.165

EFFECT OF SPRAYING BY FERTILIZER LIQUID NITROGEN AND ZINC ON SOME TRAITS OF VEGETATIVE GROWTH CHARACTERS AND INFECTION RATE OF CITRUS LEAVES DIGGER ON SOUR ORANGE SEEDLINGS (*CITRUS AURANTIUM* L.)

Shaima Qassim Abed Al Nabi Bismar, Barham KH Mohammed and Kareem A.H. Al-Bayati
Horticulture and Landscape Deportment, Agriculture College, Kirkuk University. Iraq

ABSTRACT

This experiment was conducted in Kirkuk province- Iraq in a private nursery, during the spring season of 2019, to study the effect of spraying with a liquid nitrogen fertilizer at concentrations (0, 2 and 4) ml/litre and three concentrations of zinc (0, 200 and 400) mg/L. Each of them on the vegetative growth trait of *Citrus aurantium* seedlings and the effect of the interactions between the studied factors on the vegetative growth trait and leaf content of macronutrients (NPK) and carbohydrates. The results obtained can be summarized where the spraying with liquid nitrogen fertilizer and zinc led to a significant increase in the vegetative growth trait and the leaf content of the macronutrients (NPK) and carbohydrates of the Citrus seedlings, which led to significant increases in (leaf area, dry weight of leaves, leaf content of nitrogen, phosphorus and carbohydrates). The bi-interactions of the studied factors had a clear significant effect in improving most of the vegetative growth trait and the concentration of nutrients and carbohydrates in the leaves.

Keywords : Nitrogen, Zinc, vegetative growth characters, citrus leaves digger, sour orange seedlings, *Citrus aurantium L.*

Introduction

Citrus aurantium L. (Sour Orange) is one of the perennial fruit trees belonging to the genus Citrus that belongs to the Rutaceae family, which grows in tropical and subtropical regions between latitudes 40 north and south of the equator. India is considered the origin country of Sour Orange. (Khan, 2007 ; Al-Mnisi, 1975).*Citrus aurantium* is one of the most important grafts on which different types of citrus are grafting, because of its good traits such as spreading and deepening of the roots in the soil and the success of its cultivation in a wide range of soils, especially soils of medium and heavy textures, where it tolerates high soil moisture and inappropriate environmental conditions and resists the resulting gummosis disease. About the height of the groundwater. (Salman, 1988), Nitrogen is one of the basic elements for plant growth and has many vital functions, and it is also one of the most important nutrients that help seedlings grow because the strength of seedling growth depends on increasing the number of leaves (Al-Rawi, 1991) and to avoid nitrogen deficiency on fruit trees and quickly, the best methods is Spraying the Vegetative with urea in the spring or after flowering, and this may require several sprays per year (Jones and Impey 1960). Zinc is one of the micronutrients that stimulates the formation of the amino acid tryptophan, which initiates the formation of auxin IAA, (Kessel 2006) and activates many important enzymes in the plant and is necessary for the phosphorylation and formation of glucose. The essential elements for the plant, where it plays an essential role in the production and activation of chlorophyll and is considered where a catalyst in building carbohydrates, proteins and enzymes (Mengel *et al*., 2001).

Materials and Methods

The location of experiment implementation: The study was conducted in one of the private nurseries in the Kirkuk province of during the growing season for the period from (1/4 / 2019-15 / 10/ 2019) to study the effect of spraying with different liquid nitrogen fertilizers and zinc on the growth of *Citrus aurantium* L.

Experiment treatments

The experiment was designed according to the Randomized Complete Block Design (RCBD) where a factorial experiment. It included two liquid nitrogen fertilizers and three levels of zinc (0, 2, 4) and (0, 200, 400), respectively, and with three replicates and by four seedlings for one experimental unit, thus the number of Seedlings Total experience 108 seedlings. Seedlings were spraying three sprayings during the growing season on 1/4, 15/4 and 1/5/2019.and use Cleaning fluid (Zahi) as a diffuser when spraying with a concentration of 1% to reduce the surface tension of water when spraying on the leaves. Early morning spraying with liquid nitrogen fertilizer and zinc. The data are analyzed statistically using the statistical program (SAS) and the averages are compared using the Duncan polynomial test at a probability level of (5%) (Al-Rawi and Khalaf Allah, 2000).

Study traits

1. The leaf area of the seedlings (cm^2): The measurement was done by a computer program used by the National Institutes of Health in the United States of America, where the plant leaves were scanned by a scanner with a ruler

placed in the scanner also for the purpose of determining the distance (cm) and then deceiving the plant leaves And select it and when you click on it, the leaf area is measured in cm2 digitally, as well as the ability to find an average for a number of sheets at the same time

2. The dry weight of the vegetative total (g/seedlings): where two seedlings for each experimental unit were taken out from the plastic containers with caution and the seedlings were washed with regular water several times and finally with distilled water to remove the soil, then the Vegetative were separated from the rootstock from the crown area with the help of manual scissors and after drying them airily and placed In the electric oven at a temperature of (65 ° C ± 5) or until the weight is stable, then weighed with a sensitive electronic scale.

3. Percentage of Macronutrients and Carbohydrates in the Leaves: The mature leaves were collected from different areas and from all the seedlings of the experimental units, and washed several times with distilled water to remove the dust stuck to them. The leaves were dried after placing them in perforated paper bags, and they were placed in an electric oven at a temperature (65 ° C ± 5) for 48 hours. The leaves were ground well and 0.2 g of dry samples were taken from them and digested using sulfuric acid H_2SO_4 and perchloric acid $HClO_4$ at a ratio of 1: 4 for each. of them respectively, and according to what was stated in (Johnson and Ullrich, 1959). The elements were estimated as follows:

a) **Nitrogen (%):** Nitrogen was estimated using the Micro-Kjeldahl device and according to the method presented by (A.O.A.C., 1980).

b) **Phosphorous (%):** was estimated by color method and reading the light absorption at a wavelength of 410 nm using a Spectrophotometer of EMC lab v-1 100, as described in (Estefan et al., 2013).

c) **Carbohydrates (%):** The percentage of total carbohydrates was estimated in the papers and the readings were recorded using a Spectrophotometer of EMC lab v-1 100 at wavelength of 490 nm according to what was mentioned (Dubois *et al*., 1956).

Results and Discussion

(1) Leaf area (cm^2)

The results in Table (1) showed that the leaf area was significantly affected by the levels of liquid nitrogen fertilizer, where the level (4) ml/liter excelled and reached (25.58) cm^2 while the levels (0 and 2) mg/L, gave (18.84 and 22.76) cm^2, respectively.

The level of (200) mg/L of zinc was significantly excelled and gave the highest average amounted to (24.69) cm^2, while the levels (0 and (400) mg/L gave amounted to (20.00 and 22.49) cm^2, respectively. The interaction between the levels of liquid nitrogen fertilizer and zinc was significantly excelled, the treatment of spraying with a level of (4) ml/liter of liquid nitrogen fertilizer with (200) mg/L of zinc, which gave the highest average of leaf area and reached (27.37) cm^2, With an insignificant difference when the level (4) mg/L of liquid nitrogen fertilizer interaction without spraying zinc, which gave an area of (27.31) cm^2, while the control treatment gave the lowest leaf area and reached (12.00) cm^2 when without adding both liquid nitrogen fertilizer and zinc.

(2) Dry weight for leaves (g):

The results in Table (2) showed that the dry weight for the leaves after drying was affected by the levels of liquid nitrogen fertilizer, where the level (4) mg/L significantly excelled and gave (7.51) g, with a significant difference at the level (2) mg/L, which reached (7.35) g at a level of (0) ml/L, where it reached (6.28) g. As for zinc levels, we find the level (400) mg/L significant excelled and gave (8.31) g, at the levels (0) and (200 mg/L), which reached (5.66 and 7.17) g. The interaction between the levels of liquid nitrogen fertilizer and zinc had a significant effect in this trait, where the spraying treatment was excelled to the level (2 and 4) mg/L of liquid nitrogen fertilizer with an insignificant difference between them with (400) mg / liter of zinc, which gave the highest average of the dry weight for leaves and reached (8.38) g, for the control treatment that gave the lowest weight which amounted to (3.00) g.

(3) The effect of spraying with liquid nitrogen fertilizer and zinc on the percentage of macronutrients (NPK) and carbohydrates in the leaves:

(3.1) The percentage of nitrogen in leaves (%):

The results in Table (3) showed that the percentage of nitrogen in the leaves was significantly affected by the levels of liquid nitrogen fertilizer, where it excelled the level (4) mg/L, which reached 2.595)% ,at the levels (0 and 2) mg/L, reaching (2.144 and 1) 626)%. While the level of (400) mg/L of zinc was significantly higher, which amounted to (2.745)%, at the levels (0 and 200) mg/L of zinc, which reached (1.705 and 1.916)%, respectively. As for the interaction, it is noticed that there are significant differences in this trait, where the spraying treatment was excelled to ((4) ml/liter of liquid nitrogen fertilizer with (400) mg/L of zinc by giving it the highest percentage, which amounted to (3.258)%, on the treatment of spraying with a level of (2) mg/L of liquid nitrogen fertilizer with (200) mg/L of zinc gave the lowest percentage, which was (1.091)%.

(3.2) The percentage of phosphorus in the leaves%

The results in Table (4) showed that the percentage of phosphorous in the leaves was significantly affected by the levels of liquid nitrogen fertilizer, where it significantly excelled the level (4) mg/L, which reached (0.070)% at the levels (0 and 2) ml/liter, which reached (0.049 and 0) 041)%.The level (400) mg/L of zinc was significantly higher, which reached (0.072)% in this trait, on the levels (0 and 200) mg/liter, which reached (0.048 and 0.039)%. The interaction between the levels of liquid nitrogen fertilizer and zinc had a significant effect on the percentage of phosphorus. As the spraying treatment with a level of (4) mg/L of liquid nitrogen fertilizer and (400) mg/L, as this treatment gave the highest percentage of 0.093%, the treatment of without spraying with both liquid nitrogen fertilizer and zinc gave the lowest percentage, which reached (0.027)%.

(3.3) The percentage of carbohydrates in the leaves (%):

The results in Table (5) showed that the percentage of carbohydrates in the leaves was affected by the levels of liquid nitrogen fertilizer, where it excelled the level (4) mg/L of liquid nitrogen fertilizer, which reached (2.406)% at levels (0 and 2) mg/L, and it reached (1,100) And 1.375%, respectively. The level of (400) mg/L of zinc was significantly higher, which reached (2.692)% at the levels (0

and 200) mg/L, reaching (0.948 and 1.241)%. The interaction between the levels of liquid nitrogen fertilizer and zinc had a significant effect in this trait, where the spraying treatment was excelled to (4) mg/L of liquid nitrogen fertilizer with (400) mg/L of zinc, as this treatment gave the highest percentage of (4.687)% compared to the treatment without spraying with liquid nitrogen fertilizer and zinc, which gave the lowest percentage (0.406%).

Table 1 : Effect of spraying with liquid nitrogen fertilizer and zinc on the leaf area (cm^2) of Sour orange seedlings

Interaction	The leaf area (cm^2) of Sour orange seedlings			Parameters
	400	**200**	**0.0**	**ZN N**
18.84 c	23.33 c	21.19 e	12.00 f	0.0
22.76 b	22.09 d	25.50 b	20.69 e	2
25.58 a	22.05 d	27.37 a	27.31 a	4
	22.49 b	24.69 a	20.00 c	

The values with similar letters for each factor or their interactions individually do not differ significantly according to the Duncan polynomial test under the probability level 0.05.

Table 2 : Effect of spraying with liquid nitrogen fertilizer and zinc on the dry weight for leaves (g) of Sour orange seedlings

Interaction	The dry weight for leaves (g) of Sour orange seedlings			Parameters
	400	200	0.0	**ZN N**
6.28 b	8.20 ab	7.65 bc	3.00 e	0.0
7.35 a	8.38 a	7.27 c	6.41 d	2
7.51 a	8.38 a	6.58 d	7.57 c	4
	8.31 a	7.17 b	5.66 c	

The values with similar letters for each factor or their interactions individually do not differ significantly according to the Duncan polynomial test under the probability level 0.05.

Table 3 : Effect of spraying with liquid nitrogen fertilizer and zinc on the percentage of nitrogen in the leaves (%) of Sour orange seedlings

Interaction	The percentage of nitrogen in the leaves (%) of Sour orange seedlings			Parameters
	400	200	**0.0**	**ZN N**
2.144 b	2.581 b	1.858 cd	1.991 cd	0.0
1.626 c	2.394 bc	1.091 e	1.391 de	2
2.595 a	3.258 a	2.797 ab	1.730 d	4
	2.745 a	1.916 b	1.705 b	

The values with similar letters for each factor or their interactions individually do not differ significantly according to the Duncan polynomial test under the probability level 0.05.

Table 4 : Effect of spraying with liquid nitrogen fertilizer and zinc on the percentage of Phosphorous in the leaves (%) of Sour orange seedlings

Interaction	The percentage of Phosphorous in the leaves (%) of Sour orange seedlings			Parameters
	400	200	0.0	**ZN N**
0.049 b	0.079 b	0.040 c	0.027 D	0.0
0.041 c	0.045 c	0.038 c	0.039 C	2
0.070 a	0.093 a	0.039 c	0.078 B	4
	0.072 a	0.039 c	0.048 B	

The values with similar letters for each factor or their interactions individually do not differ significantly according to the Duncan polynomial test under the probability level 0.05.

Table 5 : Effect of spraying with liquid nitrogen fertilizer and zinc on the Percentage of Carbohydrates (%) of Sour orange seedlings

Interaction	The Percentage of Carbohydrates (%) of Sour orange seedlings			Parameters
	400	200	0.0	**ZN N**
1.100 b	1.577 bc	1.318 bcd	0.406 e	0.0
1.375 b	1.812 b	1.375 bcd	0.937 de	2
2.406 a	4.687 a	1.031 cd	1.500 bcd	4
	2.692 a	1.241 b	0.948 b	

The values with similar letters for each factor or their interactions individually do not differ significantly according to the Duncan polynomial test under the probability level 0.05.

References

A.O.A.C. (1980). Official methods of analysis 13th of association of ficial analytical chemists – Washington, dc

Al-Mounisi, F.A.A. (1975). Citrus, The Scientific Foundations for its Cultivation, First Edition, New Publications House, Alexandria University. Egypt

Al-Rawi, A. and Al-Douri, A. (1991). Nurseries and Plant Propagation, Second Edition, House of Books for Printing and Publishing, University of Mosul, Ministry of Higher Education and Scientific Research.

Al-Rawi, K.M. and Abdul-Aziz, K.A.M. (2000). Design and Analysis of Agricultural Experiments, Ministry of Higher Education and Scientific Research, University of Mosul, Iraq.

Dubois, M.; Gilles, K.A.; Hamilton, J.K.; Rebers, P.A. and Smith, F. (1956). Colorimetric method for determination of sugars and related substances. Anal. Chem., 28(3): 350-6.

Estefan, George. Rolf Sommer and John Ryan (2013). Methods of soil, plants, and water analysis

Impey, R.L. and Jones, W.W. (1960). Rate of absorption of urea by intact leaves of Washington nevel orange. Proc. Amer. Soc. Hort. Sci. 76: 181-185 International, UK. 370 pages.

Johnson, C.M. and Ullrich, A. (1959). Analytical Method for Use in Plant Analysis. Bull Calif. Agric. Exp. No. 766.

Kessel, C. (2006). Strawberry Diagnotic Workshops: Nutrition. Ministry of Agriculture, Food and Rural Affairs. Canada.

Khan, I.A. (2007). Citrus Genetics, Breeding and Biotechnology. CAB

Mengel, K.; Kirkby, E.A.; Kosegarten, H. and Appel, Th. (2001). Principles of Plant Nutrition.5th Edition. Kluwer Academic Publishers. London.

Salman, M.A. (1988). Propagate horticultural plants. Baghdad University. Ministry of Higher Education and Scientific Research, Iraq.