

Influence of applying some fertilizer in growth and yield of cucumber grown under non heating greenhouses

Ridha Mustafa Abdul-Hussain¹, Kadhum Daley Hassan²,
Ahmed Hashem AL-Mashhadni³

(Department of Horticultur/ Collage of Agriculture /University of Baghdad/ Iraq)

Corresponding Author: Ridha Mustafa Abdul-Hussain

Abstract: This research was carried out in vegetable farm ,Department of Horticulture and garden design ,College of agriculture ,University of Baghdad ,Abu Ghraib using (RCBD) with three replicates in non heated plastic house with area of 180 m². Cucumber seedlings (Safe) at true leaf stage . The experimental unit contain 10 seedling with spacing of 40cm between the plants . The experimental treatment was fertilized with Al Muffer fertilizer at 40g / plant (T2) .The same fertilizer was used but with OmaxBio20 as foliar spray at 2m /L (T6) .The bio fertilizer OmaxBio20 was used at a rate of 4m /L added with the irrigation water (T3). The same bio fertilizer was used as foliar spray at 2m /L (T4).In treatment (7) the same bio fertilizer was used as foliar spray at 2m /L (T4).In treatment (T7) the same bio fertilizer was used as foliar spray and with water irrigation .Treatment (T1) represented by fertilizing the plants with urea at rate of 3.12 g/plant and supper phosphate at 4.2g / plant and potassium sulphate at 2.4 g / plant .The recommended fertilizer treatment). The treatment (T5) included foliar spray with OmaxBio20 plus the recommended fertilizer treatment . All fertilizer treatment was carried out twice in the growing season ,the first one at the vegetative growth stage and the second at flowering stage . The experimental results was statistically analysed using Genstat program was compared using L.S.D at 0.05 level . The experimental results showed that treatment (5) was significantly superior in number of leaves , dry weigh dry of plants and percentage 51.3 leaf / plant , 273.3 g/plant and 33,0% respectively. Treatment (T7) was significantly superior in plant length ,plant fresh weight ,number of fruit / plant , fruit weight g/fruit, plant yield and total yield 268.0 cm/plant ,1200.0 g/plant ,57fruit / plant ,148.6g/ plant , 8.5Kg/plant and 3.8ton/house respectively . The longest fruit of 20.0cm was in (T2) while the diameter of fruit was 6.0 cm /fruit (T3) .

Keywords: Cucumber, Fertilization, Greenhous,Horticulture. Bio fertilizers.

Date of Submission: 05-01-2018

Date of acceptance: 22-01-2018

I. Introduction

Cucumber crop was an important crop in the world and was grown in most area of Iraq from the north to south and from east to west and also growing in different environmental condition such as temperature, humidity and different soil texture in different part of Iraq . Because of its important in Iraq food habites it also grown in the sandy soil in the region between Najaf and Karbala where also the irrigation water was salty water ,so that the Iraq grower and researcher was interested in Cucumber crops .(*Cucumber sativus* L.) which belonge to cucurbitaceae to use its fruits as fresher cooked or pickles (Mattlob et al 1989) .In Iraq cucumber was grown in two seasons ,spring and autumn in open field and also grown under plastic and green houses and plastic tunnels . in Cucumber was the most important crop grown in plastic and green houses. This crop response to many types of fertilizer such as the chemical and organic types and also to the different ways of application of fertilizers specially the chemical fertilizers .The types can be added as foliar spray or with irrigation water or added before planting there is a different types of chemical fertilizer so they differ in the method of application of these fertilizers to the crops and also to their concentrations . Al-jiboury (2009) found that using nitrogen fertilizer at a rate of 30 Kg /donnam significantly increased the length of cucumber plant and the dry weight of vegetative parts to 176.9 cm /plant and 144.52g/plant as compared with 156.54cm/plant and 117.07g/plant in control treatment .When the chemical fertilizer contain different types of compounds the crops will response in different ways Jillani et al (2009) found that adding chemical fertilizer compound 60-60-120 Kg/ha to cucumber crop significantly increased plant length . Umekwe et al (2015) found that using chemical fertilizer compound NPK 15-15-15 significantly increased number of flowers and fruit as compared with control treatment .The aim of this research work is to study the influences of using the chemical fertilizer almofer pew at 20-20-20 on grown in unheated plastic houses .

II. Materials And Methods

This research was carried out in vegetable field Department of Horticulture Landscape garden / Collage of Agriculture University of Agriculture in spring season cucumber seedling (hybrid Safe) at two true leaves using (RCBD) with three replicates and seven experimental treatment in each replicates using plastic houses 180m². Each replicates contain ten plants spaced 40cm between the plants. The Al-muffer bio (azotic phosphatic fertilizer) which is added to the soil at a rate of 40g/plant (T2). The same fertilizer was used plus a foliar spray with OmaxBio20 which contain N.P.K at 20-20-20at 2ml/L (T6). In (T3)the plants was fertilized by OmaxBio20 at a rate of 4ml/L with irrigation water OmaxBio20 at a rate of 2ml/L was foliar sprayed to the plants in (T4). In (T7)the same fertilizer OmaxBio20 was sprayed to the plants and during irrigation. The plants in (T1)was fertilized using urea at 3.12g/plant and super phosphate at 4.2 g /plant and potassium sulphate at 2.4g /plant as recommended by Al- Sahaff et al (2011). In (T5) the plants was fertilized by the recommended fertilizer as in (T1) plus a foliar spray with OmaxBio20. The fertilizer treatments was added twice the first one during the vegetative growth and the second during the flowering stage. The experimental results was analysis using Genstat program and the means was compared using L.S.D at 0.05 level of significant (Al- rawi and Khalafalla,2000).

The studied characters :

A-Vegetative characters

- 1- Plant length .The length of five plants was taken using measuring tape of the end growing season .
- 2- The number of leaves was taken at the end of growing season for five plants .leaf / plant .
- 3-The fresh weight of the vegetative parts of five plant from each replicate .The plants was catted from the soil surface and the average plant weight was taken (g / plant) .
- 4-The dry weight of vegetative parts of the same five plants and dried at 70C using electrical oven (g / plant).
- 5-The percentage of dry matter :- Its calculated using the equation:

$$\% \text{ dry matter} = \text{dry weight of plant} / \text{fresh weight of plant} \times 100$$

B- Yield and it components :

- 1-Number of fruits :- The number of fruit in each treatment from the fruit picking to the end of grown season was taken divided by the number of plants in each treatments using the following equation :-
Number of plants per treatment = Total number of plants per treatment / number of plants per treatment .
- 2-Plant yield (Kg/ plant) :- The weight of the fruits in each treatment during the growing season plant divided by the number of fruits in each treatment .
- 3- Total yield ton / plastic house (180m²):- Its calculated using the following equations
Total yield = Plant yield (Kg) ×450 plants (The number of plant in 180m²) and changed to ton / plastic house

C-The qualititative characters of fruits:

- 1-Fruit length (cm / fruit) taken using measuring tape .
- 2-fruit diameter (cm / fruit) taken using vernier .
- 3-Fresh weight of fruit (g / fruit) using the following equation:-
Fruit weight = yield of the treatment / number of fruit in treatment .

III. Results And Discussion

The experiment results in Table (1) showed that (T7) significantly increased plant length to 268.0 cm / plant as compared with 230.0 cm / plant in (T1) and no significantly differences between (T1) and other treatment in this character. Treatment (T5) increased the number of leaves per plant to 51.3 leaf / plant with a significantly differences with (T2)and (T5) while these is no significantly differences with other treatments . Treatment (T3) gave the significantly lowest number of leaf per plant (41.7). The highest fresh weight of vegetative part 1200.0 (g / plant)was found in plants from (T7) as compared with other treatments .This increase in fresh weight of vegetative part was carolated with the length of plant in this treatment and table (T5) showed a positive correlation value of 0.803** at 1% level of significant. Treatment (T5) significantly increased the dry weight of vegetative parts to 273.0 with a significant differences with (T1) and (T2) . Treatment (T5) also significantly increased the dry matter percentage to 33.0 % over all the treatment except treatment (T1) .

Table 1. The effect of adding some fertilizer on vegetative growth parameters

| Treatment | Length of plant cm | Number of leaves leaf /plant | Weight of vegetative part fresh g / plant | Weight of vegetative part dry g / plant | % matter |
|------------|--------------------|------------------------------|---|---|----------|
| T1 | 230.0 | 49.7 | 800.0 | 257.0 | 32.8 |
| T2 | 253.3 | 47.0 | 950.0 | 267.7 | 28.6 |
| T3 | 255.0 | 41.7 | 825.0 | 215.7 | 26.3 |
| T4 | 260.0 | 50.0 | 1000.0 | 213.0 | 21.4 |
| T5 | 250.0 | 51.3 | 850.0 | 273.3 | 33.0 |
| T6 | 258.0 | 48.0 | 1017.0 | 225.0 | 22.3 |
| T7 | 268.0 | 48.6 | 1200.0 | 240.0 | 20/0 |
| L.S.D 0.05 | 20.3 | 4.2 | 95.1 | 23.6 | 2.7 |

The number of fruit is one of most important components of cucumber crop which effect by many factor such as variety and ecological factors such as treatment and other physiological factors .The components of fruit yield was showed in (table 2) .Foliar spray and fertigation with OmaxBio20 significantly increased the number of fruit in treatment (T7) to 57.2 fruit plant which significantly superior than other treatment while the number of fruit 40.1 fruit / plant was found in treatment (T1) .The increasing in the number of fruit per plant in treatment (T7) was positively correlated with plant length and fresh weight of vegetative parts with values of 0.675 ** and 0.676** respectively at 1 % level of significant (Table 4) . The same treatment (T7) gave the significantly the highest plant yield 8.5 Kg / plant which significantly different from other treatments . This a positive correlation between the plant yield and the length and the fresh weight of vegetative parts and the number of fruit per plant which was 0.717, 0.727and 0.984 respectively . Treatment (T7) also significantly increased the total yield to reach 3.8 ton / house which is also differ significantly from other treatment and there is a positive correlation between the total yield and the number of fruit and plant yield which reached 0.966 and 0.991 respectively .

Table 2. The effect of applied some fertilizer on fruit yield components

| Treatment | Number of fruit fruit / plant | Plant yield Kg / plant | Total yield ton / house |
|------------|-------------------------------|------------------------|-------------------------|
| T1 | 40.1 | 5.1 | 2.3 |
| T2 | 44.1 | 6.1 | 2.8 |
| T3 | 43.2 | 5.8 | 2.6 |
| T4 | 48.1 | 6.6 | 3.0 |
| T5 | 51.2 | 7.0 | 3.2 |
| T6 | 53.1 | 7.0 | 3.4 |
| T7 | 57.2 | 8.5 | 3.8 |
| L.S.D 0.05 | 3.8 | 0.48 | 0.22 |

Table (3) show a significant increases in fruit length to reach 20.0 cm / fruit which significantly different from (T3), (T5) while treatment (T3) significantly superior than other treatment except (T6) in the diameter of fruit with a diameter of 6.0 cm / fruit . Treatment (T7) gave the significantly highest fruit weight 148.6 g / fruit and superior than other treatment except(T2) and (T6) and this encerament was correlate with stem length and fresh weight of vegetative parts and the correlation coefficient was 0.555** and 0.569 respectively .

Table 3. Effect of applied same fertilizing with in fruit qualities characteristics

| Treatment | Fruit length Cm / fruit | Fruit diameter Cm / fruit | Fruit weight g / fruit |
|------------|-------------------------|---------------------------|------------------------|
| T1 | 19.0 | 5.3 | 127.5 |
| T2 | 20.0 | 5.5 | 139.1 |
| T3 | 17.7 | 6.0 | 133.6 |
| T4 | 19.3 | 4.7 | 136.4 |
| T5 | 18.0 | 5.4 | 137.1 |
| T6 | 18.7 | 5.7 | 142.4 |
| T7 | 18.3 | 5.0 | 148.6 |
| L.S.D 0.05 | 1.6 | 0.49 | 11.3 |

From tables (2) ,(3) its clear that the increases in the productively of cucumber crop which represented by the increases in plant yield and number of fruit per plant and the fruit weight which characterized by plant from treatment (T7) and this is was due to the treatment with OmaxBio20 as foliar spray plus the application with the surface irrigation which contain some nutrient elements in large concentration with same percentages . Nitrogen one of these elements which is used to from the amino acids and proteins and nucleic acids such as DNA and RNA and also the formation of purine and porphyrins which formed the chlorophyll and cytochromes ,this nutrient element also used by plant to from the plant hormones and the enzymatic Coenzymes such as NAD and NADP (Yassen 2001) . Nitrogen also used in the formation of porphyrins which used in the formation of chlorophyll unit with the nutrient element (Mg) in the center of the chlorophyll unit (Milan et al 2008). The presence of phosphorus in OmaxBio20 fertilizer also play a rate in the physiological activities in the plants due to its role in formation of nucleic acids and the phospholipids and Coenzymes such as NAD and NADP which play important role in the oxidation redaction reactions in the photosynthesis reductions and respiration and carbohydrate metabolic activities . The potassium in this fertilizer was in same level as the nitrogen and the phosphorus and also have important role in the enzymes involved in protein synthesis also the enzymes involved in oxidation redaction reactions and the translocation enzymes and regulate the osmotic pressure (AL- Sahaff 1989). The positive influences of treatment (T7) as a results of fertilizing the plants in this treatment with OmaxBio20 was with agreement with founds by (Al- Rubaai et al 2011) whom used pro-sol as foliar spray at (20-20-20) which significantly increased the fresh and dry weight of vegetative part and number of fruit per plant and plant yield and height of plant to 141.85 g /plant ,20.08 g / plant ,12.37 fruit / plant ,

1078.88 g /plant and 97.17cm / plant respectively as compared with 110.96 g /plant , 15.10 g / plant , 6.7 fruit / plant , 387.94 g /plant and 77.43 cm / plant in control treatment respectively .

Table 4. correlation coefficient between the studical characters

| Fruit weight | Fruit diameter | Fruit length | Total yield | Plant yield | Fruit no. | % matter | Dry weight | Fresh weight | Leaves no. | Plant length | |
|--------------|----------------|--------------|-------------|-------------|-----------|----------|------------|--------------|------------|--------------|----------------|
| 0.555** | -0.127 | -0.229 | 0.701** | 0.717** | 0.675** | 0.706** | 0.492* | 0.803** | 0.038 | 1 | Plant length |
| -0.102 | -0.493* | - 0.013 | 0.189 | 0.162 | 0.197 | 0.234 | 0.010 | 0.259 | 1 | | Leaves no. |
| 0.569** | 0.344 | -0.110 | 0.695** | 0.727** | -0.676 | 0.649** | -0.331 | 1 | | | Fresh weight |
| -0.030 | 0.042 | 0.233 | -0.045 | -0.079 | -0.047 | 0.530* | 1 | | | | Dry weight |
| -0.548* | 0.264 | -0.048 | -0.599** | 0.605** | -536* | 1 | | | | | % matter |
| 0.639* | -0.261 | -0.145 | 0.966** | 0.984** | 1 | | | | | | Fruit no. |
| 0.735** | -0.220 | -0.128 | 0.991** | 1 | | | | | | | Plant yield |
| 0.762 | -0.225 | -0.104 | 1 | | | | | | | | Total yield |
| 0.067 | -0.107 | 1 | | | | | | | | | Fruit length |
| 0.051 | 1 | | | | | | | | | | Fruit diameter |
| 1 | | | | | | | | | | | Fruit weight |

IV. Conclusion

We can conclude that foliar spray and adding OmaxBio20 with irrigation water significantly increased the productivity of cucumber crop grown under non heated plastic houses .

References

- [1]. Mattofb,A.N.,Sultan.M.A.,Saleh.K.A.,1989.Vegetable production .part 2-2nd edition Minsitry of higher education and scientific research .Mosel university .Iraq.
- [2]. Yassen,B.T.,2001. Principe of plant physiology. Collage of sciences ,University of Qaker . Dar Al-Sark.Qatar.
- [3]. Amujoyegbe,B.j.,j.T.Opbode A.Qlayinka .2007 .Effect of application of organic and inorganic fertilizers on chlorophyll contents and grain yield of Maize(*Zea mays* L.) and Sorghum (*Sorghum bicolor* L.Moench).African Journal of Biotechnology.Kenya .Vol.6(1) :1869-1873
- [4]. Al-Rubaa, B.,Jaber,G.A.,Hakam.k.I.2011.Effect of foliar spray of same plant nutrient method of plant on growth and yield of cucumber plants (*cucumber sativus* L.) Rami variety grown in plastic house . Al-Kadesyia Journal of Sciences .(1).42-51.
- [5]. Al-Sahaff,F.H.,1989.Applied plant nutrient of higher education and scientific research University of Baghdad Bait Al-Heakma .Iraq.
- [6]. Al-Sahaff, F.H.,Al-Muharib ,M.z.,K.,Al-Saady .F.M.J.2011.Responese of cucumber Hybrid to the chemical and organic fertilizers. Iraq .j.Agre-Sci.42(4)52-62.
- [7]. Heldt,H.,2005.Plant Biochemistry .An update and translation of the German 3rd ed .,Library of Congress Cataloging in Publication Data USA. PP:630 .
- [8]. Gollan,J.R.and J.T.Wright .2006.Limited grazing by native herbiores on the invasive seaweed caulerpa .Taxi folia in a temperate .Australia estuary marine and fresh water Research .57(7):685-694
- [9]. Al-Rawi,K.M.,Mohommod.Kh.A.,2000.Design and analytical of agriculture experiments Minsitry of higher education and scientific research . Iraq.
- [10]. Jilani, M. S., A.K. Waseem and M. Kiran. 2009. Effect of Different Levels of NPK on the Growth and Yield of Cucumber (*Cucumis sativus* L.). Under the Plastic Tunnel. Journal Of Agriculture & Social Sciences, 5(3):99-101.
- [11]. Rioux,L-E.,S.L.Turgeon and M.Beaulieu .2007 .Characterization of polysaccharides extracted from brown seaweeds .carbohydrate polym 69:530-517.
- [12]. Al-Jubury ,M.A.,A.2011.Effect of humic acid and seaweeds as growth and flowering and yield of (*cucumber sativus* L.) M.Sc. thesis Department of Horticulture .Collage of Agriculture University of Tikreat.Iraq.
- [13]. Milan,P.,H.Tea.M.Adrijana ,P.Ana and c.Tomisliv .2008.Nitrogen management for Potato by using rapid test methods .Faculty of Agric .Univ.of Mastar .PP.1799
- [14]. Calvo,P.,N.Louise and W..R.Joseph .2014.Agriculture Uses of Plant Biostimulants :A Review Marschner .Plant Soil .383(1):3-41.
- [15]. Umekwe, P.N.,F.M. Okpani and I.O.Okocha. 2015. Effect of Different Rates of NPK 15:15:15 and Pruning Methods on the growth and Yield of Cucumber(*Cucumis sativus* L.) in Unwana-Afikpo. IJSR,4(10):36-39.
- [16]. Tomas,S.C.L.1996.Nutrient weeds as soil Amendments for Organic cally Growth Herbs .Spices and Medical plant .4(1):3-8 .
- [17]. Zeang ,X .and E.H .Eivin .2004 .Cytokinine-containing seaweed and humic acid extracts associated with creeping Bentgrass leaf cytokinins and drought resistance Crop Sci.44:1737-1745.

Ridha Mustafa Abdul-Hussain "Influence of applying some fertilizer in growth and yield of cucumber grown under non heating greenhouses." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 11.1 (2018): 01-04.