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THE RESPONSE FIVE CUCUMBER HYBRIDS FOR NANO FERTILIZERS UNDER PROTECTED CONDITIONS

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Abstract

Nanotechnology is modern science that has received wide attention in the recent period and its applications are nano fertilizers that play an important role in developing agricultural crops. So the field experiment was conducted on 9/17/2018 in the plastic house in Babylon province to study five hybrids (Baher, Jasser, Cader, Mawasem and Jamela) and spray with mineral fertilizers 1.5 g liters-1 (control treatment) and nano fertilizer (2.1) g litre-1 gave the Baher and Jamela hybrids the best results and excelled in most studied traits the percentage of dry matter material (3.528, 3.901) and early yield weight (831, 805) and total weight yield (3051,3417), respective, The level of 2 g liter-1 of the nano fertilizer was distinguished by its significantly excelled in most of the studied traits , the percentage of dry matter (3,860), early yield weight (522), and total yield weight (3228). The interaction between the Jamela hybrid and the nano fertilizer spraying 2 gm-1excelled in most studied traits, including the percentage of the dry matter for the fruits (4530) and the total yield weight (3663).
Keywords **:** Nano Fertilizers, cucumber hybrids, dry matter.

Introduction

The cucumber plant (*Cucumis sativus* L.) is one of the crops of the cucurbitaceae family and important in Iraq and in many countries of the world, and the regions of Southeast Asia, especially India, China and Africa, are their origin country (Matlab *et al*., 1989). The importance of cucumber fruits is that they contain 96.3% water from the weight of the fruit, although the water makes up the large percentage of the weight of the fruit, but it is distinguished by its nutritional and medicinal value because it contains Ca, P.F.K, protein, carbohydrates, vitamins C, B1 and B2. The option is one of the vegetables that The consumer offers them to use the fruits for different purposes, as they are used extensively either as a crop with nutritional value or by picking their fruits for preservation throughout the year, as well as in salads and fast food. In order to satisfy this growing demand for cucumber crops, there has been a significant development in the production method, whether in open or protected agriculture and the use of modern techniques such as nano fertilizer technology to reduce the overuse of traditional fertilizers that exacerbate the harmful effects on human health and the environment, Nano materials are currently being used as nanotechnology provides new multidisciplinary windows in agricultural and food sciences and contributes to many agricultural research that can lead to new ways to solve many agricultural problems. where nanoparticles have other potential applications in the farming system Such as the detection of pollutants, plant diseases, pests, and pathogens, especially in foliar fertilization or soil fertilization (Mijweil and Kadem, 2018; AL-Taey and AL-Musawi, 2019) Nano-structured fertilizer exhibits novel physico-chemical properties, so that they can satisfy plant root demand more efficiently in comparison with conventional fertilizers (AL-Juthery *et al*., 2018; Mijwel and Jabber, 2019) The controlled release of the nutrient could be through the process of dissolution and ion exchange reactions (AL-Juthery *et al.*, 2018).

Based on the above, the research aims to evaluate the performance of a number of hybrids to find out the best suited to the conditions of the Middle Euphrates region. The research also aims to study the effect of spraying with nano fertilizer on a hybrids number of cucumbers cultivated in unheated plastic homes in order to reach the best concentration of nano fertilizer and achieve the highest return on production with high nutritional value.

Materials and Methods

The experiment was conducted in a greenhouse on a private farm located in the Al-Mahaweli region of Babylon province during the autumn season of 2018-2019.

Random samples were taken from the field soil before cultivated and at a depth of 30 cm. The samples were mixed homogeneously and analyzed in the central laboratory of Directorate of Agriculture in the Holy Karbala shown in (Table 1)

The greenhouse with an area of 504 m 2 was prepared and its length was 56 m , width of 9 m and a height of 3.5 m from tillage, smoothing, leveling and sterilizing the greenhouse by exposing it to sunlight, after that the land was divided into terraces by 5 terrace width of 60 cm and the distance between a terrace and another 1 m while leaving a distance on both sides house 1 m, The greenhouse was covered with polyethene, The addition of the equalizer chemical fertilizer NPK of 5 kg per terrace is recommended. The terraces were distributed in the form of sectors for each sector, divided into 15 experimental units, with 20 plants for each experimental unit, which will be distributed alternately on both sides of the terrace, and the distance between one plant and another 40 cm, leaving an area of 40 cm between one experimental unit and another (Mahmoud *et al*., 1986). The research was conducted as a factorial experiment with split plot according to the Randomized Complete Block Design (RCBD) with three replicates, where the experiment included two factors, the application of nano fertilizer in the main plot and with three concentrations and Cucumber hybrid in the sub plot. Nanoferture (nano processed fertilizer) consisting of 8% iron, 1.5% zinc, 1.5% magnesium, 0.5% copper, 0.5% boron and 0.5% molybdenum were used. The conventional microelements were used as control treatment and consisted of (4% iron, zinc 4%, manganese 3%, copper

0.5%, boron 1.5%, magnesium oxide 1.1%) and the treatments were as follows:

Studied Traits

Leaf area: The leaf area of the foliage was calculated as reported in Lotfi (1986).

Relative chlorophyll content: The chlorophyll ratio was measured by the SPAD-502 Chlorophyll meter

Percentage of dry matter of leaves: According to the dry weight of leaves as reported in Al-Sahaf (1989).

Number of days for 50% flowering of the plants: according to the number of days from the beginning of cultivated until the flowers of 50% of the experimental unit plants are opened

Fruit length: Measured by tape measure

Fruit Diameter: Measured by Vernier

Percentage of dry matter of fruits: According to the dry weight of fruits as reported in Al-Sahaf (1989).

Weight of early yield : express the yield of the first four harvesting 665 as an early yield

Total yield weight: total production (kg. Plastic house-1) = per plant yield kg (number of plants per house (1400 plants)

Percentage of total Soluble solids (TSS): Read the percentage of total soluble solids by hand refractometer.

Results and Discussion

The traits of vegetative growth

Table (2) showed that the Jamela hybrid was significant in the leaf content of chlorophyll and the percentage of the dry matter of the leaves, where the highest average reached 35.38 and 13.866. From Table (2), it is evident that foliar spraying with nano fertilizer has a significant effect when treatment N3 in the studied traits, compared to the control treatment. It was also shown from Table (3) that the interaction between hybrids and fertilizer treatments notes the excelled of the interaction between the Jasser hybrid and the fertilizer treatment N3 significant difference in traits the leaf area which gave 20092

The interaction between the Jamela hybrid and the fertilizer treatment N3 was significantly excelled in the percentage of the dry leaf material amounted to 14.371 and no significant difference was recorded in the leaf content of chlorophyll. From Table (2), it is evident that the Jamela hybrid was significantly excelled to vegetative growth traits (leaf area, the percentage of dry matter in leaves, and leaf content of chlorophyll) compared to other hybrids. This may be due to the genetic difference between the hybrid resulting from the variation of the genetic factors responsible for the growth traits Vegetative or possibly different content of this hybrid growth hormone (Sager, 2009). As for the results of the nano fertilizer concentrations, the concentration 2 g. Liters had a significant effect on the traits of vegetative growth. It led to an increase in the traits of the leaf area, the percentage of the dry matter in the leaves and the leaf content of chlorophyll. It is due to the fact that the nano fertilizer possesses unique properties such as its small particle size and high surface area and thus leads to an increase in its absorption by the plant, the interaction of the nanostructure affects the susceptibility to the spread and melting of nutrients and thus leads to an increase in photosynthesis in the plant (Sekhon, 2014 and Tanou *et al*., 2017).

Table 2 : The effect of hybrids and nano fertilizer on a number of studied traits

Treatments	Leaf area	The leaves content of chlorophyll	The percentage of dry matter for the leaves	Number of days for 50% flowering of the plants	Percentage of dry matter for fruits
Baher	17180	34.00	13.887	30.333	3.528
Jasser	18000	32.42	12.264	33.333	3.330
Cadiar	17658	33.44	11.241	33.778	3.223
Mawasim	15833	35.40	11.542	33.556	3.228
Jamela	17992	35.38	13.866	29.333	3.901
LSD0.05	1236.3	1.163	0.1406	0.5847	0.1786
Fertilizer treatments	**Leaf area**	**The leaves content of chlorophyll**	**The percentage of dry matter for the leaves**	**Number of days for 50% flowering of the plants**	**Percentage of dry matter for fruits**
Control N1	15770	32.80	12.258	32.067	3.025
N2 $g.L^{-1}$	17070	34.19	12.569	32.067	3.441
N3 $g.L^{-1}$	19158	35.40	12.853	31.267	3.860
LSD0.05	1040.4	0.535	0.0582	0.3206	0.1058

Table 3: The effect of interaction between hybrids and the effect of nano fertilizer on a number of studied traits

Treatments	Leaf area	The leaves content of chlorophyll	The percentage of dry matter for the leaves	Number of days for 50% flowering of the plants	Percentage of dry matter for fruits
N1H1	15414	30.67	13.583	31.000	3.090
N1H2	17133	31.40	12.102	34.333	2.740
N1H3	16482	32.73	10.872	34.333	3.020
N1H4	14288	34.30	11.333	33.667	2.890
N1H5	17992	34.90	13.400	31.000	3.383
N2H1	16637	35.37	13.957	30.333	3.670

N2H2	16776	32.30	12.293	33.667	3.397
N2H3	17313	32.97	11.220	33.667	3.123
N2H4	15940	35.17	11.547	33.667	3.227
N2H5	18686	35.13	13.827	29.000	3.790
N3H1	16637	35.97	14.120	29.667	3.823
N3H2	16776	33.57	12.397	32.000	3.853
N3H3	17313	34.63	11.630	33.333	3.527
N3H4	15940	36.73	11.747	33.333	3.567
N3H5	18686	36.10	14.371	28.000	4.530
LSD0.05	2050.1	N.S	0.2212	0.9316	0.2860

Fruits growth traits

From Table (4) it is clear that Jamela hybrid significantly in the Number of days for 50% flowering of the plants, percentage of dry matter, early yield, fruit diameter and T.S.S. The total yield weight was 29,333, 3,901, 6,622, and 3417, respectively. The jasser hybrid was a significant difference in the fruit length where it recorded the highest average amounted to 16,639 cm. From Table (4), it is evident that foliar spraying with nano fertilizers has a significant effect when treatment N3 in the studied traits compared to the control treatment. As shown in Table (5), the interaction between hybrids and fertilizer treatments notes the excelled of the interaction between the Jamela hybrid and the fertilizer treatment N3 significant difference in the studied traits, the number of days for flowering 50% of the plants, the percentage of dry matter for the fruits, the weight of the early yield, fruit diameter, TSS, and the total yield weight reached 28,000, 4.530, 821, 31.660, 6.867, and 3663 respectively, The interaction between the hybrid Jasser and the fertilizer treatment N3 showed a significant difference in the fruit length traits, with the highest average amounted to 17.150.

The reason for increasing the plant yield is due to the entry of zinc in the synthesis of chlorophyll, as well as a cycle in the formation of Auxin and some important enzymes that have a role in the process of photosynthesis and this is consistent with Patil *et al*. (2008).

Al-Kaabi (2006) indicated that the increase in the number of fruits and the fruit yields will be when the level of fertilizing with iron increases

The reason for this increase may be due to the physiological role of the iron element in the biological processes of the plant, the most important of which is the process of building proteins and photosynthesis, which encourages the flowering process and the proportion of contracted flowers, as well as giving the largest number of fruits to the plant.

Table 4: The effect of hybrids and nano fertilizer on a number of studied traits.

Treatments	**Weight of early yield**	**Fruit length**	**Fruit Diameter**	**T S S**	**Total yield weight**
Baher	831	16.377	30.760	6.511	3051
Jasser	246	16.639	30.388	6.222	3019
Cadiar	240	16.002	30.503	6.544	2977
Mawasim	368	16.349	30.569	6.467	2958
Jamela	805	16.266	31.133	6.622	3417
LSD0.05	95.0	0.1860	0.3411	0.1364	78.9
Fertilizer treatments	**Weight of early yield**	**Fruit length**	**Fruit Diameter**	**T S S**	**Total yield weight**
Control N1	478	15.974	30.391	6.313	2929
N2 $g.L^{-1}$	493	16.355	30.654	6.480	3097
N3 $g.L^{-1}$	522	16.650	30.967	6.627	3228
LSD0.05	N.S	0.1023	0.1570	0.1047	41.1

Table 5: The effect of the interaction between hybrid and the effect of nano fertilizer on a number of studied traits

Interaction Treatments	**Weight of early yield**	**Fruit length**	**Fruit Diameter**	**T S S**	**Total yield weight**
N1H1	811	16.197	30.357	6.300	2847
N1H2	268	16.203	30.520	6.200	2856
N1H3	226	15.463	30.080	6.500	2870
N1H4	328	16.153	30.480	6.367	2796
N1H5	758	15.843	30.517	6.200	3274
N2H1	875	16.380	31.027	6.500	3065
N2H2	280	16.563	30.150	6.133	3096
N2H3	162	16.227	30.153	6.633	3022
N2H4	313	16.387	30.717	6.633	2987
N2H5	836	16.220	31.223	6.333	3313
N3H1	806	16.553	30.897	6.733	3241
N3H2	190	17.150	30.493	6.333	3103

N3H3	330	16.317	31.277	6.500	3039
N3H4	464	16.507	30.510	6.700	3092
N3H5	821	16.723	31.660	6.867	3663
LSD0.05	176.6	0.2964	0.5389	0.2236	125.3

References

Al-Juthery, H.W.A.; Ali, N.S.; Al-Taey, D.K.A. and Ali, E.A.H.M. (2018). The impact of folair application of nanofertilizers, seaweed and hypertonic on yield Potato. *Plant Archives,* 18(2): 2207-2212

Al-Juthery, H.W.A.; Habeeb, K.H.; Altaee, F.J.K.; AL-Taey, D.K.A and Al-Tawaha, A.A.M. (2018). Effect of foliar application of different sources of nano-fertilizers on growth and yield of wheat. Bioscience research, 15(4): 3988-3997

Al-Kaabi, M.J.M. (2006). The effect of water magnetized on irrigation of urea, iron and zinc on the response of orange seedlings. Master Thesis. College of Agriculture, University of Baghdad.

Al-Sahaf, F.H.R. (1989). Applied Plant Nutrition. Dar Al-Hekma Press, Ministry of Higher Education and Scientific Research. Baghdad University. Iraq.

Al-Taey D.K.A. and Al-Musawi, Z.J.M. (2019). Effect of Nano-fertilizers, salicylic acid, and organic matter in growth and yield of rocket (*Eruca sativa* Mill) under Salt stress. International Journal of Botany Studies 4(3):77-81.

Anou, G.; Ziogas, V. and Molassiotis, A. (2017). Foliar Nutrition, Biostimulants and Prime-Like Dynamics in Fruit Tree Physiology: New Insights on an Old Topic. Frontiers in Plant Science, 8(75):1-9.

Lotfi, Al-Saeed Lotfi Al-Sayed Fathi, (1986). The effect of nitrogen forms and different calcium levels in nutritional solutions on the growth and yield of tomato plants. Master Thesis, College of Agriculture, University of Baghdad, Iraq.

Mahmoud, H.A.A.; Ali, M.M. and Nabil, N. (1986). The effect of cultivation dates and distances on tomato production in greenhouses (gable design) and without heating. Agricultural Research Proceedings, Volume 1, Part Two, Fourth Scientific Conference of the Scientific Research Council, Iraq.

Matlab, A.N.; Izz Al-Din, S.M. and Karam, S.A. (1989). Vegetable Production, Part Two, Higher Education Press., University of Mosul, Ministry of Higher Education and Scientific Research, Republic of Iraq.

Mijwel, A.K. and Abboud, A.K. (2018). Growth and yield of potato (*Solanum tuberosum* L.) as influenced by nano-fertilizers and different planting dates. Res on Crops, 19(4): 649-654.

Mijwel, A.K. and Jabbr, R.S. (2019). Impact of nano-fertilizer on the genetic and phenotypic parameters of tomato cultivars. Res. on Crops, 20(2): 338-344.

Patil, B.C.; Hosamani, R.M.; Ajjappalavara, P.S.; Naik, B.H.; Smitha, R.P. and Ukkund, K.C. (2008). Effect of foliar application of micronutrients on growth and yield components of tomato (*Lycopersicon esculentum* Mill.). Karnataka J. Agric. Sci., 21(3): 428-430

Saqr, M.T. (2009). Growth and Flowering Organizations. Department of Plant Physiology, Faculty of Agriculture, Mansoura University, Egypt.

Sekhon, B.S. (2014). Nanotechnology in agri-food production: an overview. Nanotechnology, Science and Applications, 7: 31-53.