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EFFECT OF SLOW RELEASE FERTILIZERS, BIOFERTILIZERS, HUMIC ACID AND SULFUR ON CANTALOUPE PLANTS UNDER LOW TUNNELS CONDITIONS.

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ABSTRACT

This work was performed to study the interaction between the rates of enciabein (slow release nitrogen fertilizer), biofertilizers, sulfur and humic acid of cantaloupe (*Curcumas melo* L.) cv. The stydy was conducted at Bear- EL Abd, North Sinai governorate during two successive seasons 2008 and2009 .The used cantaloupe was ideal F1 hybrid . The treatment was on main plot : Enciabein at a rate of 40 units, Enciabein at a rate of 80 units and Enciabein at a rate of 120 units and sub main plot was Humic acid (HA) applied at the rate of 50 mg/kg soil 15 days after transplanting, Esterna (E) at a rate of 40 kg/ fed. Esterna biofert mixed with wet sand into the absorption zone of plant roots were applied before transplanting and at 45 and 75 days from transplanting, Sulfur (S) at a rate of 500 ppm was applied before transplanting and Control (C) 100 % recommended NPK.The record parameters were: - Plant height (cm). leaf area (cm2) the average leaf area was measured for the 5th true leaf by using laser leaf area meter. Number of leaves per plant. Fresh weight per plant (g). Dry weight per plant (g) ,the average dry weight of plant sample was dried at 70°C .Fruit physical characteristics were recorded,such as fruit length (cm) fruit diameter (cm). Shape index (L/D). Flesh thickness (cm).Also, yield and its components were recorded , such as early yield (kg/plant) for the first two picking, total yield (ton/ fed)and average fruit weight (g). The best results of plant height, leaf area, no. of leaves, fresh weight plant and dry weight plant, fruit length(Cm) , fruit diameter(cm) , shape index, flesh thickness(cm) , Tss (%) , N%,

P% ,K%,(Fe,Zn,Cu,Mn(ppm)), early yield (ton/fed) total yield ton/fed. Average fruit weight (gm) was found in slow release fertilizers with 40unite and humic acid. The aim of this work is to improve yields and its quality via bio fertilizers and humic acid. Inaction, slow release with sulfur may effects on elements aspirations which lead to enhance the plant vegetative growth, also in increased the yield and its quality.

Key words: bio fertilizers, humic acid, sulfur, slow release fertilizers, cantaloupe, and tunnels conditions.

INTRODUCTION

Slow released fertilizer (enciabein) is evident from several new products marketed in the recent years .The potential benefits claimed are increasing plant use efficiency by prolonged soil reduction and decrease fertilizer application, thus saving fertilizer and application costs *(El- Ailla and Abou- Seada 1996*) Also, urea formaldehyde is considered one of the world leading nitrogen fertilizer due to its high nitrogen content 46% low commercial .It has, however, the major limitation of easy dissolution in water and rapid hydrolysis .

This condition causes high nitrogen losses through ammonia volatilization. Application of slow released fertilizer (enciabein) can eliminate the inefficiency of nitrogen application after planting and the risk of burning newly established plants with high pre- plant fertilizer application. *Lorenz et al (1974)* found that the use of slow released fertilizer (SCU), sulfur coated urea in potato cultivation gave the greatest tuber yield than the other source (urea). Moreover, *Pew et al (1984)* stated that slow released fertilizers produced high yield and excellent quality of lettuce compared with soluble fertilizer. Also, *Abdel- Fattah et al (1987)* reported that urea formaldehyde (UF) increased cucumber yield when applied at a rate of 35,75,125 and 150 g\m2 which gave 16%,18%,25% and 35% increase , respectively, when compared with the control. Furthermore, *Zhao and Wang (1991*) found that applying slow released urea increased soybean yield as compared with ordinary urea. However, *Hekal (1992)* reported that urea formaldehyde increased total yield of spinach plants. Also, *Hasanein and Kabeel (2006)* indicated that the application of enciabein at a rate of 150 units N per feddan gave the highest total potato yield.

Organic acids induce such action on iron in soil and let iron chelate the elements and keep it available, lowering the soil pH and thus increasing the solubility of iron and / or reaction with iron to form organic soluble pentrateable salts. Omran et al. (1987). Germida (1990) reported four main groups of biological sulphur transformations in soil which were: (1) sulphate reduction in living systems, (2) mineralization of organic sulphur to sulphate, (3) dissimilatory sulphate reduction to form sulphide, and (4) oxidation of inorganic sulphur. Other processes which may be important in the soil system included leaching adsorption and volatilization. Abou El-Fadl *et al.* (1992) referred that carbon content of the humic acids ranged between 52.28 and 56.60 % and those of nitrogen ranged between 3.22 and 3.87 %. Generally, carbon and nitrogen contents were slightly affected by sources of the humic acids.

The lower ranges are exhibited by fulvic acids and humic acids in tropical soils. Fulvic acid distinguishes itself from humic acid by higher oxygen and lower hydrogen and nitrogen contents. The oxygen content was 44 – 54 % in fulvic acids versus 33 - 46 % in humic acids. The nitrogen content in fulvic acids shows a range of 0.7-2.6 % in contrast with humic acids which contains 2-5 % N. However, (Tan,(1993) and El-Ghozoli, (1994) observed that total carbon content of humic acids amounted 47.31 and 41.29% for humic acids derived from rice straw and cotton stalks, whereas the corresponding average values of total nitrogen were 2.84 and 2.21 % respectively. Also, the V/N ratios of humic acids were fluctuated between 6.28:1 and 40:1.Singh and Amberger, (1995) found that the production of humic acids increased with time while fulvic acids increased up to 30 days and than decreased continuously. Abou-Baker and Omar (1996) demonstrated that using organic compost alone or organic + NPK fertilizers lowered soil Ec when compared to the control and inorganic treated soil. Pronk, (1997) explained that three methods were used to determine the microbial activity. He found that carbon dioxide and the nitrogen release revealed more microbial activity in the composted products than in the peat. Because their N and P content are from 1 to 2 % and the N mineralization rate is near 10%.

Humic acids are usually rich in carbon which ranges from 41 to 57 %. Shafei (1997) reported that application of sulphur or sulphur fertilizer mixtures (SFM) has increased nutrients' content of wheat plant, namely: P, Fe, Mn, Zn and Cu. Germida (1990) reported four

main groups of biological sulphur transformations in soil which are: (1) sulphate reduction in living systems, (2) mineralization of organic sulphur to sulphate, (3) dissimilatory sulphate reduction to form sulphide, and (4) oxidation of inorganic sulphur. Other processes which may be important in the soil system include leaching, adsorption and volatilization. Organic agriculture is rapidly growing all over the world and has gained a worldwide reputation during the last 20 years as a new environmentally, socially and economically sound production system. This concept is now fully integrated in the agricultural systems of many developed and undeveloped countries (Hanafi and Kenny, 2001).Buluck *et al*. (2002) noticed that soil fertility amendments enhanced biological, chemical and physical attributes of soil compared to synthetic fertilizers. Nevertheless, the addition of soil amendments led to increase propagule densities of *Trichoderma* species, thermophilic microorganisms, enteric bacteria, and decreased number of plant pathogenic microorganisms. Used mixed bio and organic fertilizers in a pot experiment for sandy and clay soils under greenhouse conditions. The obtained results showed that the growth and NPK uptake of shoots and roots exhibited significant increase due to compost application as compared to control treatment.

The objective of this research was to study the influence of slow released fertilizers (enciabein) and bio fertilizers on plant height, yield and fruit quality of cantaloupe.

The aim of this work is to improve yields and its quality via bio fertilizers and humic acid. Inaction, slow release with sulfur may effects on elements aspirations which lead to enhance the plant vegetative growth, also in increased the yield and its quality.

MATERIALS AND METHODS

The research work was performed to study the interaction between the rates of enciabein (slow released nitrogen fertilizer) with biofertilizers, sulfur and humic acid and their effects on cantaloupe plants plants under low tunnels condition .The experiment was carried out at Bear- EL Abd, North Sinai governorate during two successive seasons 2008 and 2009 .The experimental design was split plot with four replicates ,having the rates of nitrogen (enciabein) fertilizers in the main plots and biofertilizers, sulfur and humic acid were randomly

distributed in the sub plots .Each sub plot had one row with dimensions of 15 m long ,1.5 m width. Planting distance was 50 cm apart .Each sub plot include 30 plants of the used cantaloupe hybrid The used cantaloupe was ideal F1 hybrid. Seed sowing was conducted on August 12th 2008 and on August 19th 2009 in the nursery .Seedling transplanting was performed on August 25th 2008 and on August 31st 2009 then they were put under clear polyethylene low tunnels.

Treatments:-

A- main plot:

1- Enciabein at a rate of 40 units. (E 40 unit)
2- Enciabein at a rate of 80 units. (E 80 unit)
3- Enciabein at a rate of 120 units. (E 120 unit)

B-sub main plot:

1- Humic acid (HA) applied at the rate of 50 mg/kg soil after 15 days from transplanting.
2- Esterna (E) at a rate of 40 kg/ fed. Esterna biofert mixed with wet sand into the absorption zone of plant roots before transplanting and after 45 and 75 days from transplanting.
3- Sulfur (S) at a rate of 500 ppm was applied before transplanting.
4- Control (C) contained 100 % recommended NPK.

The trenches rows were filled with rates of Enciabein were added through drip irrigation .Block polyethylene mulch and drip irrigation system were implemented before planting and each ridge covered by clear polyethylene low tunnels of 80 micron in thickness .Fertigation and other cultural practices were applied as recommended by Ministry of Agriculture .The soil analysis of the experimental soil were carried out at soil laboratory, Agriculture Research Center (ARC). Physical and chemical analysis of the soil are presented in Table (1).

Table (1): Some physical and chemical properties of the investigated soil.

2008										
Physical properties					Chemical properties					
Sand %	Silt %	Clay %	Texture	OM %	PH	EC ds/cm	Total N%	available N ppm	available P ppm	Available K ppm
95.13	2.42	2.45	Sandy	1.36	7.27	4.59	0.23	12.76	10.93	75.31
2009										
94.38	2.51	3.11	Sandy	1.29	6.98	4.48	0.29	11.11	9.85	70.93

Character studies:-

A random sample of five plants from each sub plot were taken after 90 days from transplanting to record the following parameters:-

1- Plant height (cm).

2- Leaf area (cm^2), the average leaf area was measured for the 5^{th} true leaf by using laser leaf area meter.

3- Number of leaves per plant.

4- Fresh weight per plant (g).

5- Dry weight per plant (g), the average dry weight of plant sample was dried at 70^oC.

- Chemical composition:-

Sample of the fourth top leaf was dried at $70C^o$ in order to get rid of the water content of the leaf and then weighed and digested in order to determine N, P and K contents.

- Total nitrogen (%) in leaves was determined by using the micro kjeldahl by A.O.A.C. (1990).
- Phosphorus (%) was determined calorimetrically at 550 mm as described by Ranganna (1979).
- Potassium (%) was determined by flame photometer as described by Ranganna (1979).
- Micro nutrients Fe, Zn and Mn contents were determined for the above ground dried vegetative parts by using atomic absorption spectrophotometer according to Chapman and Prett (1961).
- Total soluble solid (TSS) was determined by using refrectometer A.O.A.C. (1991).

-Fruit physical characteristics:-

1- Fruit length (cm)

2- Fruit diameter (cm).

3- Shape index (L/D).

4- Flesh thickness (cm).

- Yield and its components:-

1- Early yield (kg/plant) for the first two picking.

2- Total yield (ton/ feddan).

3- Average fruit weight (g).

Statistical analysis:-

All obtained data were subjected to statistical analysis for variance by using split plot design as mentioned by Gomez and Gomez (1983) for calculating the least significant differences between treatments.

RESULTS AND DISCUSSION

1- Vegetative growth

Data in table (2) presented the effect of slow released fertilizers and some supplements on vegetative growth of cantaloupe plants grown under low tunnels conditions during 2008 and 2009 seasons. Data showed that there was significant difference in all vegetative growth parameters (plant height, leaf area, no. of leaves, fresh weight /plant and dry weight /plant). The highest values were observed with slow released fertilizers with the rate of 40 units. However, the lowest value was found when slow released fertilizer of 120 unit was applied. On the other hand, the highest value of supplements was found for humic acid. However, the lowest one was found for Esterna. The interaction between the slow released fertilizers and the supplements was significant.

The highest interaction was found when the treatment of E 40unit with humic acid was applied. These results might be attributed to the simulative effect of nitrogen on the meristmatic activity of plant tissues since nitrogen is a constituent of proteins, nucleic acid and many other important substances of plant cell Lorenz et al (1974) and El- Ailla and Abou- Seada 1996

2- NPK and other elements contents.

Data illustrated in table (3) revealed that there was significant effect of slow released fertilizers on macro and micro elements under study except N content in both seasons.

As for supplements, they were significantly affected macro and micro nutrients .The highest one was registered for E40 unit treatment. The lowest one was found for E120 unit treatment. In the both seasons. The interaction between slow released fertilizers and supplements significantly affected macro and micro elements. The highest one was obtained for E40 with HA in the two seasons.

Whilethe lowest interaction was found for E 120 with C. These results were true during the two studied seasons. Application of bio fertilizers or slow released fertilizers (enciabein) in this case, can eliminate the inefficiency of nitrogen application after planting and the risk of burning newly established plants with high pre- plant fertilizer application .These results are full agreement with those obtained by Omran et al. (1987). Germida, (1990), Zhao and Wang (1991), Abou El-Fadl et al. (1992) and, Hekal (1992)

Table (2) Effect of slow release fertilizers and some supplements on vegetative growth of cantaloupe plants grown under low tunnels conditions.

Constituents		2008					2009				
Main	Sub Main	plant heigh t (cm)	Leaf area (cm^2)	No .of Leaves / plant	fresh weight /plant (g)	Dry weight /plant (g)	plant heigh t (cm)	leaf area (cm^2)	No .of Leaves / plant	Fresh weight /plant (g)	Dry weight/ plant (g)
A	E 40	171.6	173.4	78.5	725.4	159.4	172.6	170.6	76.9	721.8	180.1
	E 80	170.5	172.4	77.3	722.6	158.6	171.5	169.7	76.0	720.5	159.3
	E120	169.0	171.0	75.8	718.7	155.8	170.2	168.4	74.8	714.9	157.3
L.S.D.at 0.05		0.5	0.16	0.49	1.0	0.1	0.8	0.1	0.9	0.3	0.02
B	HA	172.6	174.3	79.7	728.2	165.9	173.4	171.7	77.8	732.8	164.0
	E	168.5	170.5	75.1	717.3	147.1	169.8	167.8	74.2	701.0	151.8
	S	170.1	172.2	77.3	721.4	155.7	171.3	169.6	75.8	716.0	157.6
	C	164.3	167.1	71.6	708.6	141.1	166.6	164.4	70.3	609.9	147.1
L.S.D.at 0.05		1.7	1.2	1.6	3.47	4.05	2.16	1.09	0.85	7.17	2.25
AXB											
E40	HA	175.0	176.5	82.3	734.3	170.7	175.6	173.4	79.7	740.2	167.7
	E	171.4	173.2	78.0	725.3	155.3	172.4	170.4	76.7	718.0	157.7
	S	174.2	175.5	80.3	729.7	164.0	174.6	172.4	78.7	728.3	162.3
	C	165.9	168.4	73.3	712.7	147.7	167.7	166.0	72.7	700.7	152.7
E80	HA	170.5	172.3	77.7	723.0	167.3	171.4	170.1	76.0	735.0	164.7
	E	165.2	167.7	72.0	709.7	144.3	166.9	165.0	71.7	695.7	149.7
	S	169.1	171.4	77.0	620.0	152.7	170.5	169.2	75.3	713.0	156.0
	C	164.1	166.9	71.0	707.7	139.0	166.2	164.0	69.7	681.3	146.0
E120	HA	172.4	174.0	79.0	727.3	159.7	173.4	171.6	77.7	723.0	159.7
	E	169.0	170.5	75.3	717.0	141.7	170.0	167.9	74.3	689.3	148.0
	S	167.1	169.7	74.7	714.7	150.3	168.9	167.0	73.3	706.7	154.3
	C	163.1	166.0	70.3	705.7	136.7	165.9	163.2	68.7	669.7	142.7
L.S.D.at 0.05		2.7	1.8	1.6	6.15	4.3	1.4	2.7	0.78	8.3	1.08

E40 = Enciabein at a rate of 40 unite N
E80 = Enciabein at a rate of 80 unite N
E120= Enciabein at a rate of 120 unite N
HA = Humic acid applied at the rate of 50 mg/kg soil
E = Esterna at a rate of 40 kg/ fed
S = Sulfur (S) at a rate of 500 ppm
C = Control contained 100 % recommended NPK

Table (3) Effect of slow release fertilizers and some supplements on macro and micro nutrients of cantaloupe plants grown under low tunnels conditions.

Constituents		2008						2009					
Main	Sub Main	N %	P %	K %	Fe ppm	Zn Ppm	Mn Ppm	N %	P %	K %	Fe ppm	Zn ppm	Mn Ppm
A	E 40	3.9	0.66	5.15	305.2	34.0	43.3	3.7	0.60	5.22	303.2	31.3	40.5
	E 80	3.9	0.65	5.13	303.5	32.5	41.8	3.6	0.59	5.17	301.8	30.0	39.0
	E120	3.8	0.63	5.03	300.8	30.0	39.5	3.5	0.57	5.05	299.4	27.3	36.8
L.S.D.at 0.05		N.S	0.01	0.02	1.4	1.1	0.52	N.S	0.02	0.04	1.2	0.73	0.69
B	HA	3.5	0.71	5.38	307.0	36.0	45.0	3.9	0.65	5.44	305.0	33.7	42.0
	E	3.7	0.66	4.75	300.2	29.0	38.7	3.1	0.59	4.79	298.0	27.0	36.3
	S	3.6	0.64	5.02	303.1	32.0	41.0	3.5	0.57	5.05	301.0	30.7	38.7
	C	3.3	0.74	4.42	293.1	23.3	33.3	2.8	0.66	4.51	293.0	20.0	30.7
L.S.D.at 0.05		0.13	0.07	0.093	2.73	3.01	2.18	0.04	0.02	0.06	1.19	2.22	1.04
AXB													
E40	HA	4.3	0.74	5.53	310.0	39.0	48.0	4.0	0.68	5.62	308.3	36.0	45.0
	E	3.8	0.64	5.05	305.7	34.0	43.0	3.5	0.58	5.14	303.7	32.0	41.0
	S	4.1	0.69	5.27	309.0	37.0	46.0	3.8	0.63	5.36	306.7	35.0	43.0
	C	3.4	0.57	4.74	296.0	26.0	36.0	3.3	0.50	4.74	295.7	22.0	33.0
E80	HA	4.2	0.71	5.47	303.3	33.0	42.0	3.9	0.65	5.46	301.7	31.0	39.0
	E	3.3	0.54	4.64	295.0	24.0	34.0	3.0	0.48	4.67	294.0	21.0	32.0
	S	3.7	0.62	4.95	302.0	31.0	40.0	3.4	0.56	4.93	300.3	30.0	38.0
	C	2.9	0.82	4.37	293.0	23.0	33.0	2.7	0.73	4.44	292.7	20.0	30.0
E120	HA	4.1	0.67	5.14	307.7	36.0	45.0	3.7	0.61	5.24	305.3	34.0	42.0
	E	3.9	0.80	4.56	300.0	29.0	39.0	2.8	0.70	4.55	299.0	28.0	36.0
	S	3.1	0.59	4.85	298.3	28.0	37.0	3.3	0.53	4.86	297.0	27.0	35.0
	C	3.5	0.83	4.16	291.7	21.0	31.0	2.5	0.75	4.35	291.0	18.0	29.0
L.S.D.at 0.05		0.01	0.02	0.17	7.34	0.09	2.15	0.02	0.04	0.08	5.69	1.07	1.12

See footnotes of table 2.

Data in Table (4) showed that there were no significant differences between slow release fertilizers in N and P. However there were significant differences in K, Fe, Zn and Mn in the both seasons.

In the supplements, there were significant differences between macro and micro nutrients (N, P, K, Fe, Zn and Mn) in Humic acid and sulfur treatments, in the both seasons. There were significant differences in the interaction between all treatments between macro and micro nutrients (N, P, K, Fe, Zn and Mn) in the both seasons. .These results were agreement with those of (Hanafi and Kenny, 2001).Buluck et al. (2002)

Table (4) Effect of of slow release fertilizers and some supplements on macro and micro nutrients of cantaloupe fruits grown under low tunnels conditions.

Constituents		2008						2009					
Main	Sub Main	N %	P %	K %	Fe Ppm	Zn Ppm	Mn Ppm	N %	P %	K %	Fe ppm	Zn ppm	Mn Ppm
A	E 40 unite	2.8	0.54	3.39	229.8	28.3	33.3	2.8	0.61	3.62	249.8	25.5	31.0
	E 80 unite	2.8	0.53	3.39	217.5	26.8	31.8	2.8	0.61	3.60	237.8	23.5	29.5
	E120 unite	2.6	0.51	3.27	201.0	24.5	29.3	2.6	0.60	3.50	221.5	21.3	27.3
L.S.D.at 0.05		N.S	N.S	0.04	2.18	0.72	0.35	N.S	N.S	0.02	3.49	0.63	0.27
B	Humic acid	3.1	0.57	3.64	240.7	30.0	35.0	3.0	0.65	3.80	260.0	26.7	33.0
	Esterna	2.3	0.47	2.98	194.7	23.7	28.0	2.3	0.54	3.25	216.7	20.7	26.3
	Sulfur	2.6	0.52	3.26	211.0	26.7	31.3	2.6	0.59	3.53	234.7	23.0	29.0
	Control	1.9	0.43	2.60	158.0	17.7	22.3	1.9	0.49	2.98	177.7	15.7	21.0
L.S.D.at 0.05		0.16	0.06	0.23	7.31	2.56	3.28	0.07	0.03	0.17	5.97	1.63	2.15
AXB													
E40	Humic acid	3.3	0.61	3.72	267.0	33.0	38.0	3.2	0.67	3.92	286.0	31.0	36.0
	Esterna	2.8	0.51	3.35	229.0	28.0	33.0	2.7	0.59	3.54	249.0	25.0	31.0
	Sulfur	3.0	0.56	3.54	252.0	32.0	37.0	2.9	0.64	3.75	271.0	28.0	34.0
	Control	2.2	0.47	2.93	171.0	20.0	25.0	2.3	0.55	3.25	193.0	18.0	23.0
E80	Humic acid	3.2	0.57	3.75	218.0	27.0	32.0	3.1	0.66	3.84	238.0	23.0	30.0
	Esterna	2.1	0.45	2.86	163.0	19.0	23.0	2.1	0.53	3.17	184.0	16.0	22.0
	Sulfur	2.5	0.50	3.17	203.0	25.0	30.0	2.5	0.58	3.48	227.0	22.0	28.0
	Control	1.9	0.42	2.52	156.0	17.0	22.0	1.8	0.48	2.96	177.0	15.0	21.0
E120	Humic acid	2.9	0.53	3.45	237.0	30.0	35.0	2.8	0.61	3.64	256.0	26.0	33.0
	Esterna	2.0	0.44	2.73	192.0	24.0	28.0	2.0	0.50	3.05	217.0	21.0	26.0
	Sulfur	2.4	0.49	3.06	178.0	23.0	27.0	2.4	0.56	3.35	206.0	19.0	25.0
	Control	1.7	0.40	2.35	147.0	16.0	20.0	1.6	0.45	2.73	163.0	14.0	19.0
L.S.D.at 0.05		0.27	0.01	0.14	3.27	0.53	0.29	0.16	0.02	0.28	5.37	0.43	0.17

See footnotes of table 2.

3- Physical and chemical characteristics:-

Data in table (5) indicated that, physical and chemical characteristics were significantly affected by slow released fertilizers. The highest value was found in the treatment which includes 40 unite of slow release fertilizers. However, the lowest value was found in the treatment which includes 120 unite during both seasons. On the other hand, there was no significant difference in fruit diameter, shape Index and TSS in the two growing seasons.

The highest value in the supplements was found in humic acid. However, the lowest value was found in Esterna. The interaction between the slow release fertilizers and the supplements was significant. The highest interaction was found in the treatment which includes enciabein with a rate of 40 nitrogen units/ feddan with huamic acid in both seasons. Similar results have been found by,

Abdel- Fattah et al (1987), (Tan,(1993) and El-Ghozoli, (1994), and Shafei (1997)

Table (5) Effect of slow release fertilizers and some supplements on physical and chemical characteristics of cantaloupe plants grown under low tunnels conditions.

Constituents		2008					2009				
Main	Sub Main	Fruit length (cm)	Fruit diameter (cm)	shape index	Flesh thickness (cm)	TSS (%)	fruit length (cm)	Fruit diameter (cm)	Shape index	Flesh thickness (cm)	TSS (%)
A	E 40 unite	8.8	12.9	0.679	3.6	14.0	8.5	12.7	0.668	3.6	14.0
	E 80 unite	8.7	12.9	0.678	3.5	14.0	8.4	12.6	0.668	3.5	14.0
	E120 unite	8.5	12.6	0.677	3.4	13.8	8.3	12.3	0.671	3.3	13.9
L.S.D.at 0.05		0.02	N.S	N.S	0.02	N.S	0.01	N.S	N.S	0.03	N.S
B	Humic acid	8.9	13.3	0.668	3.9	14.4	8.7	13.1	0.664	3.8	14.5
	Esterna	8.0	12.1	0.657	2.9	13.3	7.9	11.8	0.668	2.9	13.3
	Sulfur	8.4	12.8	0.659	3.3	13.8	8.3	12.4	0.670	3.3	13.9
	Control	7.8	11.6	0.675	2.6	12.8	7.5	11.4	0.661	2.5	12.8
L.S.D.at 0.05		0.13	0.18	0.004	0.12	0.22	0.26	0.17	0.003	0.36	0.23
AXB											
E40	Humic acid	9.1	13.6	0.671	4.2	14.6	8.9	13.4	0.667	4.0	14.8
	Esterna	8.5	12.8	0.661	3.4	13.9	8.4	12.6	0.666	3.5	14.0
	Sulfur	8.8	13.1	0.668	3.7	14.3	8.7	12.9	0.674	3.7	14.4
	Control	8.7	12.1	0.716	2.9	13.3	7.9	11.8	0.667	2.9	13.4
E80	Humic acid	8.9	13.4	0.666	4.0	14.5	8.8	13.1	0.668	3.9	14.6
	Esterna	7.8	11.9	0.657	2.8	13.1	7.8	11.5	0.675	2.7	13.1
	Sulfur	8.3	12.7	0.658	3.2	13.6	8.2	12.3	0.664	3.3	13.8
	Control	7.5	11.4	0.655	2.5	12.7	7.4	11.3	0.658	2.4	12.6
E12 0	Humic acid	8.7	13.0	0.668	3.6	14.0	8.5	12.9	0.658	3.6	14.2
	Esterna	7.6	11.7	0.651	2.6	12.8	7.6	11.4	0.664	2.5	12.9
	Sulfur	8.1	12.5	0.651	3.1	13.4	8.1	12.0	0.672	3.0	13.6
	Control	7.3	11.1	0.655	2.4	12.4	7.2	11.0	0.658	2.2	12.3
L.S.D.at 0.05		0.063	0.032	N.S	0.01	0.03	0.02	0.12	N.S	0.026	0.022

See footnotes of table 2.

4- Yield and its components:-

Data in Table(6) represent the effect of slow release fertilizers and some supplements on yield and its components of cantaloupe fruits grown under low tunnels conditions during the two growing seasons of 2008 and 2009. Data showed that there were significant differences in early yield (ton/fed), total yield (ton/fed) and average fruit weight (gm). The highest value was found in the treatment which includes enciabein with a rate of 40 nitrogen unit/ feddan. However, the lowest value was found in the treatment which includes enciabein with a rate of 120 nitrogen unit/ feddan in both seasons.

Table (6) Effect of slow release fertilizers and some supplements on yield and its components of cantaloupe fruits grown under low tunnels conditions.

Constituents		2008			2009		
Main	Sub Main	Early yield ton/fed.	total yield ton/fed.	average fruit weight (gm)	early yield ton/fed.	Total yield ton/fed.	Average fruit weight (gm)
A	E 40 unite	3.1	13.0	792.4	3.0	13.3	770.7
	E 80 unite	2.9	12.7	740.8	2.8	13.0	718.2
	E120 unite	2.9	12.5	716.8	2.6	12.9	699.3
L.S.D.at 0.05		0.02	0.18	9.37	0.07	0.01	8.52
B	Humic acid	3.3	13.2	831.3	3.2	13.5	804.3
	Esterna	2.7	12.6	721.1	2.7	12.9	698.0
	Sulfur	3.0	12.9	778.0	2.9	13.2	753.3
	Control	2.6	12.2	669.4	2.4	12.7	661.8
L.S.D.at 0.05		0.15	0.24	17.92	0.12	0.16	14.38
AXB							
E40	Humic acid	3.5	13.3	835.3	3.3	13.6	824.7
	Esterna	3.0	12.9	784.3	3.0	13.2	754.3
	Sulfur	3.3	13.1	825.3	3.1	13.4	809.7
	Control	2.8	12.6	724.7	2.7	12.9	694.0
E80	Humic acid	3.3	13.2	844.0	3.3	13.5	814.0
	Esterna	2.6	12.5	705.7	2.5	12.8	674.0
	Sulfur	3.0	12.8	766.0	2.8	13.2	835.7
	Control	2.4	12.1	647.3	2.4	12.6	649.0
E120	Humic acid	3.1	13.0	814.7	3.0	13.4	774.3
	Esterna	2.6	12.4	673.3	2.5	12.8	665.7
	Sulfur	2.8	12.7	742.7	2.8	13.0	714.7
	Control	2.5	11.9	636.3	2.3	12.4	642.3
L.S.D.at 0.05		0.04	0.13	3.28	0.03	0.21	4.58

See footnotes of table 2.

On the other hand, in supplements treatments the highest early yield (ton/fed), total yield (ton/fed) and average fruit weight (gm) was found in the humic acid treatment. However, the lowest value was found in Esterna. The interaction between the slow release fertilizers and the supplements was significant. The highest interaction was found in the treatment which includes enciabein with a rate of 40 nitrogen units/ feddan with huamic acid in both season. These results were agreement with those of Pew et al (1984), Singh and Amberger, (1995), Abou-Baker and Omar (1996), Pronk, (1997), and Hasanein and Kabeel (2006).

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تاثير الاسمدة بطيئة التحلل والاسمدة الحيوية وحمض الهيوميك والكبريت على نمو ومحصول الكنتالوب تحت الانفاق البلاستيكية

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** المعمل المركزي للمناخ الزراعى - قسم بحوث تعديل المناخ

أجريت هذه الدراسة فى عامي 2008و2009 فى منطقة بئر العبد محافظة شمال سيناء لدراسة زيادة إنتاجية محصول الكنتالوب من خلال الأسمدة الحيوية والاسمدة بطيئة التحلل باستخدام السماد النتروجينى بطئ التحلل الأنسيابين وحمض الهيوميك والكبريت بالإضافة الى الكنترول (سماد الدواجن بمعدل 20 م^3 للفدان) وكانت المعاملات هي

1- سماد نتروجينى بطئ التحلل (انسيابين) بمعدل 40 وحدة نيتروجين لكل فدان.
2- سماد نتروجينى بطئ التحلل (انسيابين) بمعدل 80 وحدة نيتروجين لكل فدان.
3- سماد نتروجينى بطئ التحلل (انسيابين) بمعدل 120 وحدة نيتروجين لكل فدان.
4- حمض الهيوميك بمعدل 50 ملجم لكل كجم تربة.
5- المعلق البكتيرى (استيرنا) بمعدل 40 كجم لكل فدان .
6- كبريت بمعدل 500 جزء فى المليون يضاف قبل الزراعة..
7- سماد الدواجن بمعدل 20 م^3 للفدان (كنترول).

واهم النتائج المتحصل عليها :-

1- استخدام السماد النتروجينى بطئ التحلل انسيابين بمعدل 40 وحدة نتروجين لكل فدان. أعطى أعلى نمو خضرى (طول النبات - مساحة الورقة- عدد الاوراق والوزن الطازج والجاف لكل من الاوراق والسيقان) بينما استخدام السماد النيتروجينى بطئ التحلل انسيابين بمعدل 120 وحدة نتروجين لكل فدان اعطى اقل نمو خضرى لنباتات الكنتالوب
2- استخدام السماد النيتروجينى بطئ التحلل انسيابين بمعدل 40 وحدة نتروجين لكل فدان. + حمض الهيوميك معدل 50 ملجم لكل كجم تربة . أدى الى الحصول على أعلى تركيز من العناصر الكبرى NPK وبعض العناصر الصغرى مثل Mn; Fe فى نباتات الكنتالوب
3- يؤدى استخدام. السماد النتروجينى بطئ التحلل انسيابين بمعدل 40 وحدة نيتروجين لكل فدان. + حمض الهيوميك معدل 50 ملجم لكل كجم تربة الى زيادة الصفات الطبيعية مثل طول وقطر الثمرة وكذلد يؤدى. الى زيادة الصفات الكيميائية مثل المواد الصلبة الكلية الذائبة لثمار الكنتالوب
4- كان أعلى محصول كلى بالطن لكل فدان 13.0 كجم لكل نبات ومحصول مبكر 3.1 ومتوسط وزن الثمرة 792.4 عند. استخدام السماد النيتروجينى بطئ التحلل انسيابين بمعدل 40 وحدة نيتروجين لكل فدان. + حمض الهيوميك معدل 50 ملجم لكل كجم تربة وكان اقل محصول ومكوناته عندما تم إضافة السماد النيتروجينى بطئ التحلل انسيابين بمعدل 120 وحدة نيتروجين لكل فدان. + المعلق البكتيرى استيرنا معدل 40 كجم لكل فدان .