ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 45(3): 1183-1198, (2007).

EFFECT OF SOME STIMULANTS AND NITROGEN SOURCES ON CUCUMBER PLANTS GROWN IN GREENHOUSE UNDER SALINE CONDITIONS

BY

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ABSTRACT

Two field experiments were carried out during the two successive winter seasons of 2003/2004 and 2004/2005 to study the effect of some stimulants i.e., *Bacillus subtilis*, two yeast strains (*Saccharomyces cerevisiae* 110, *and Rhodotorula glutinis* 119,)., and humic acid or either of the both organic manures i.e.,Farmyrd manure or Chicken manure combined with 33.3% NPK and 100% recommended NPK mineral fertilizer on growth, chemical composition as well as early and total fruit yield and its quality. Stimulants increased plant height, number of leaves and the percentage of N, P, and K in leaves and stem, number of fruit/m^2, early and total fruit yield, length, diameter, T.S.S and N, P and K in fruits.

The combination between the 33.3% of the recommended NPK mineral fertilizer with 33.3%FYM and 33.3%Ch manure seems to increase plant growth characters, early and total fruit yield and its components as well as chemical composition (N, P and K) of leaves, stem and fruits with some exceptions of fruit quality as compared with control plants which were only supplied with 100% NPK. The higher values of the plant growth and the percentage of N, P and K in leaves, stem, early and total yield, fruit quality and the percentage of N, P and K in the fruit were ob'ained by 33.3%FYM plus 33.3%Ch manure plus 33.3% NPK mineral fertilizers. The combined effect of stimulants and 33.3%FYM plus 33.3%Ch 33.3% NPK mineral fertilizers significantly increased growth characters, early and total fruit yield and its components as well as chemical composition (N, P and K) of leaves, stem and fruits with some exception of fruit quality.

The higher of values of plant growth and the percentage of N, P and K in leaves, stem, early and total yield, fruit quality and the percentage of N, P and K in the fruit were obtained by humic acid combined with 33.3%FYM plus 33.3%Ch manure and 33.3% NPK mineral fertilizers.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the most important vegetable crops, it belongs to the family cucurbitaceae. The economic importance of this crop appears in both local consumption and exportation .

Plants grown in saline soils face two problems: high salt concentration in the soil solution (i.e. high osmotic pressure) and correspondingly low soil water potential

and high concentrations of potentially toxic ions such as Cl^- and Na^+ or unfavorable combination of salt ions (e.g., a high Na^+/Ca^{+2} ratio). Salt exclusion minimizes ion toxicity but accelerates water deficit in plants, whereas absorption facilitates osmotic adjustment but can lead to ion toxicity and nutritional imbalance. In most instances, however, growth inhibition in salt sensitive species even at low salinity levels is caused primarily by ion toxicity (Marschner, 1995).

The need to develop crops with higher salt tolerance has increased tremendously within the last two decades, due to the increasing use of saline water and heavy fertilization for intensive cultivation. The organic fertilizer conditions decrease the harmful effect of high rates of salinity without root damaging which may occur if the inorganic fertilizers were applied at the same rate (Cooke, 1972).

Humic acid was applied at the rates of 1.0 and 2.0 g/Kg soil partly depressed the negative effect of salinity (Demir, *et al.* 1999). Growth of tomato, cucumber and bean plants tended to be increased by treatments of 50-500 mg/kg soil of humic acids (Atiyeh, *et al.*, 2002, Turkmen, *et al.*, 2004 and Zaky *et al.*, 2006).

Yeasts are chemo organotophes, which have the ability to grow and proliferate extensively on the most raw substrates. Their tolerances to wide range of temperature, pH levels, oxygen and salts have stimulated interest in their potential rate in biotechnology osmophilic. yeast strains are in fact osmotolerant organisms and are distinguished by their ability to grow well at high concentrations of sugar and salt solutions (Onishi, 1963 and Norkrans, 1966). Makary and El-Sayed, (2000) and Safaa (2006). found that inoculation of faba bean plant with yeast strains (*Saccharomyces cerevisiae* 110, *and Rhodotorula glutinis* 119,) . Significantly increased plant growth parameters and overcame salinity stress.

B. *subtilis* is known to positively influence plant vitality and the ability of the plant to cope with a biotic stressing condition such as drought and salinity (Bochow *et al.*, 2001). The high salinity treatment (5.4 and 7.4 mS/cm) with B. Subtitis had improved vegetative plant growth of tomato (Woitke *et al.*, 2004). Inoculated lettuce plants with B. Subtitis increased shoot and root weight (Arkhipova *et al.*, 2005)

Therefore, the aim of the present study was to evaluate the effect of treatment with *B. subtilis*, Yeast strains, Humic acid, organic and inorganic fertilizers on growth and productivity of cucumber grown in greenhouse under saline conditions.

MATERIAL AND METHODS

Two field experiments were carried out in unheated plastic greenhouses (6 X 40 m, 2.7 m height) at the Farm of Banny Salama, Imbaba, Giza, Cairo, A.R.E, during the two successive winter seasons of 2003-2004 and 2004-2005.

Cucumber plants (*Cucumis sativus* L) cv. Hesham F_1 Rs parthenocarpic was used (Royal Sulis companyl, Holland).

Seeds of cucumber were sown in the nursery in foomtrays filled with a mixture of peat moss and vermiculite (1:1 volume) on 11th of October in both seasons,

seedling of 15 days old were transplanted in the greenhouse ($240m^2$) on ridges 1 m wide at spacing of 50 cm between rows and 50 cm between plants.

Soil samples were collected at random before planting from the top layer (0-30 cm depth) for physical and chemical analysis Table (1). For soil physical properties were determined using the procedures described by Black *et al.* (1981) for particle size distribution and soil texture, while soil chemical analysis was measured according to the procedures described by Jackson (1973). Irrigation water was also analyzed as shown in Table (1) .Organic manure contents of total available N, P and K are presented in Table (2).

Table (1): Some physical and chemical properties of the experimental soil and irrigation water in 2003/2004and2004/2005.

Soil characteristics	2003/2004	2004/2005
Particle size distribution (%)		
Coarse sand	89.22	88.01
Fine sand	9.74	10.96
Silt	0.16	0.19
Clay	0.88	0.84
Texture class	Sandy	Sandy
$CaCO_3$ (%)	5.50	9.10
O.M. (%)	0.25	0.22
pH (1:2.5 soil suspension)	7.90	8.00
EC dS/m	5.10	5.50
Cations and anions in soil paste (meq/L)		
Ca^{2+}	38.90	40.80
Mg^{2+}	7.60	7.20
Na^{+}	7.60	9.10
K^{+}	1.85	2.70
CO_3^{2-}	0	0
HCO_3^{-}	6.40	6.80
Cl^{-}	12.70	14.8
SO_4^{2-}	35.85	38.20
Available N(ppm)	85.00	80.00
Available P(ppm)	32.86	28.05
Available K(ppm)	120.00	100.00
Water analysis		
EC dS/m	0.80	0.85
Cations and anions in water (meq/L)		
Ca^{2+}	2.24	2.50
Mg^{2}	4.76	4.80
Na^{+}	3.70	3.90
K^{+}	0.10	0.15
CO_3^{2-}	0	0
HCO_3^{-}	2:42	2.92
Cl^{-}	2.50	2.90
SO_4^{2-}	7.90	5.53

Table (2): Chemical analysis of tested organic fertilizers during the seasons of 2003/2004and2004/2005

Properties	2003 - 2004		2004 – 2005	
	Farmyard manure	Chicken manure	Farmyard manure	Chicken manure
EC (1:10)	1.46	4.05	1.30	3.2
pH (1:10)	8.49	8.46	8.00	8.1
O.M (%)	32.71	73.6	28.8	64.3
O.C (%)	18.97	42.68	16.9	38.1
C/N ratio	1: 26	1: 12	1: 20	1: 14
Total macronutrients				
N (%)	0.71	3.48	0.82	2.8
P (%)	0.53	1.66	0.47	0.91
K (%)	0.76	2.73	1.86	1.4
Total micronutrients (ppm)				
Fe	1620	2400	1750	1750
Mn	400	320	235	265
Zn	60	132	182.3	195.5
Cu	70	85	38	39

Treatments were as follows:

1. Stimulant treatments:

The experiment included 4 treatments

1- Without treatment (control)

2- *Bacillus subtilis*

3- Yeast strains (*Saccharomyces cerevisiae* 110, *and Rhodotorula glutinis* 119,).

The bacteria and yeasts inoculum were added with irrigation water (5 ml /plant) every 15-days from transplanting for three months (Biofertilization production Unit; Soils, Water and Environment Research Institute; ARC; Egypt).

4- Humic acid: applied at the rates of 50mg/Kg soil (25mg/Kg soil two times) every 15-days from transplanting.

*Weight of $5m^2$ soil =1600 *0.25d* 5 = 2000 Kg. soil

d: soil depth.

1. Nitrogen sources:

Three sources of nitrogen and their combination were used as follows:

1- Chicken manure

2- Farmyard manure

3- NPK (100% recommended dose N,P and K)

4- 50 % Ch + 50 % NPK

5- 50 % FYM + 50 % NPK

6- 33.3% NPK + 33.3% FYM +33.3% Ch

Organic fertilizer and calcium super phosphate were added through the ditches before transplanting and ditches were covered by soil. Mineral fertilizers were added to the soil using ammonium sulfate (20.6 %N) as a source of nitrogen

at a rate of 50 unit N /240 m^2, calcium super-phosphate (15.5 % P_2O_5) as a source of phosphorus at a rate of 20 unit P_2O_5 / 240 m^2 and potassium sulfate (48 % K_2O) as a source of potassium at a rate of 50 unit K_2O / 240 m2. The quantities of the chemical fertilizers were added weekly in equal doses with the irrigation water starting from transplanting. Drip irrigation lines were spread over the ditches.

Split plot design with three replicates was used and the plot area was ($5m^2$) precautions had been done to prevent contamination among fertilization treatments with an 1 m empty row.

The main plot contained organic and inorganic manure, whereas the sub-plots were assigned for the stimulant treatments and bio-fertilizer.

Data recorded was as follows:

1-Vegetative growth.

Random samples of five plants from each treatment were chosen 120 day after transplanting and the following data were recorded.

1-Plant height (cm)

2- Leaf number / plant

2-Yield and its components.

1- Early yield (kg /m^2):Fruits of first eight harvests from each treatment were weighed to calculate the early yield .

2- Total yield (kg /m^2)

3- Fruit characteristics: Five fruits from each treatment were taken randomly for determining average fruit characters as follows.

A-Fruit length (cm).

B-Fruit diameter (cm).

C-Fruit weight (g).

3-Chemical constituents

Samples of leaves, stems and fruits of cucumber plants were taken at 120 days from transplanting and were oven dried at 70 °C for 72 hr. till constant weight. The dry samples were pulverized separately and then a sample was acid digested.

The percentage of total nitrogen, phosphorus and potassium in the acid digested samples of dry leaves, stem and fruits of cucumber plants were determined as follow:

1. Nitrogen determination (N): Total nitrogen was determined as a percentage using microkjeldahl apparatus as described by Black *et al* (1981).
2. Phosphorus percentage: it was determined calorimetrically as reported by Trough and Meger (1939).
3. Potassium percentage: it was determined flame photo metrically as report by Brown and Lilliland (1946).
4. The total soluble (T.S.S.) of fruits: determined was using a hand refractometer, according to the method described by A.O.A.C (1980).

RESULTS AND DISCUSSION

1. Growth characters

Data in Table (3) indicate that, application of stimulants i.e. *Bacillus subtilis*, two yeast strains (*Saccharomyces cerevisiae* 110, *and Rhodotorula glutinis* 119,)., and humic acid significantly increased plant height and number of leaves per plant. In this regard, the application of humic acid led to the highest response of cucumber plant growth. This may be due to production of plant growth hormones like gibberellins; humic fraction exhibits an auxin like activity producing higher amounts of phenolic and carboxyl products through the metabolic processes (Nardi *et at.*, 1999).

The combination between 50% of recommended NPK with any of tested organic manures or 33.3%FYM plus 33.3% Ch plus 33.3% NPK mineral fertilizers tend to increase the growth characters of cucumber plants as compared with the control (100%NPK mineral fertilizers). The obtained results agreed with those of Borin *et al.*, (1987) on potato, Browaldh (1992) on bean and Abdallah *et al*, (2006) on cucumber who reported that organic manure is rich and slow release fertilizer, which leads to a clean product of plants. They added also, that using organic fertilizer in sandy soil improves the soil texture. The structural improvement can encourage the plant to have a good root development by improving the aeration in the soil, which leads to higher plant vegetative growth.

Humic acid combine with 33.3% FYM + 33.3% Ch + 33.3 % NPK mineral fertilizers was considered the best treatment as it gave the highest mean values of all studied growth characters, in both seasons .

2. Leaves and Stems chemical constituents:

Data presented in Tables (4 and 5) show the effect of stimulants and nitrogen sources as well as their combinations on NPK content of plant leaves and stems during both seasons of growth. Such data reveal that macro- elements contents (NPK) were significantly affected with the application of stimulants. The highest values of macro – elements content in leaves and stems were obtained from using humic acid as compared with untreated plants. These results were true in both seasons of study.

Concerning the effect of nitrogen fertilizer sources. The same data in Tables (4 and 5) indicate that macro – elements content of cucumber leaves and stems were gradually and significantly increased by the application of nitrogen fertilizer as33.3 % NPK + 33.3 % FYM + 33.3 % Ch as compared with the control (100%NPK mineral fertilizers).

Concerning the effect of the interaction, data in Tables (4 and 5) show that nitrogen and potassium content in leaves and stems were significantly affected by the interaction between stimulants and nitrogen fertilizer sources in both seasons. Phosphorus content was not significantly affected by the interaction treatments. However, the highest values of macro – element content were recorded in plants, which received humic acid, and 33.3% NPK +33.3% FYM + 33.3% Ch, while the lowest value was recorded with those received 100% NPK without stimulants. These results were true in both seasons. This results harmony with those reported by Abed-El- Moniem, *et al.*, (2002) Mona, *et al.*, (2005) and Abdallah, *et al.*, (2006) on cucumber plants.

Table (3): Effect of stimulants ,nitrogen sources and their interactions on plant height and number of leaves for cucumber plants in 2003-2004 and 2004-2005.

Treatments		Season (2003-2004)		Season (2004-2005)	
Stimulants(S)		plant height	Number of leaves	plant height	Number of leaves
Without		155.65	33.63	168.01	34.21
B		175.92	38.30	185.14	39.26
Y		183.81	41.34	195.38	41.38
H		195.59	44.22	206.75	44.86
LSD at (0.05)		3.10	0.35	3.33	0.39
Nitrogen sources(N)					
NPK		127.05	29.50	131.19	31.66
FYM		162.48	36.21	178.05	35.32
CH		176.90	39.18	185.26	37.73
FYM+NPK		191.23	41.83	202.10	41.57
CH+NPK		197.16	43.06	211.16	42.95
FYM+NPK+CH		211.63	46.46	225.17	50.33
LSD at (0.05)		4.90	0.45	5.22	0.50
S*N					
NPK	Without	107.90	24.67	115.00	25.33
	B	120.00	26.30	125.23	30.30
	Y	135.30	29.57	139.30	33.50
	H	145.00	37.47	145.23	37.50
FYM	Without	142.20	30.20	155.65	30.30
	B	163.10	35.33	178.00	34.45
	Y	169.00	39.30	188.30	36.30
	H	175.60	40.00	190.25	40.23
CH	Without	155.00	33.20	169.25	31.20
	B	178.10	38.12	180.50	39.30
	Y	180.10	41.10	190.00	37.50
	H	194.40	44.30	201.30	42.90
FYM + NPK	Without	170.50	35.60	180.90	36.32
	B	189.00	41.30	195.98	40.60
	Y	195.00	44.20	209.00	43.65
	H	210.42	46.20	222.50	45.69
CH + NPK	Without	178.30	36.43	188.70	38.00
	B	195.32	42.30	205.65	41.30
	Y	199.20	45.40	212.70	45.00
	H	215.80	48.10	237.60	47.50
FYM+ NPK+ CH	Without	180.00	41.67	198.56	44.10
	B	210.00	46.47	225.50	49.60
	Y	224.23	48.47	233.00	52.30
	H	232.30	49.23	243.60	55.33
LSD at (0.05)		3.22	0.99	3.91	1.01

B:*Bacillus subtilis* **Y:**yeast strains **H:**Humic acid

Table (4): Effect of stimulants ,nitrogen sources and their interactions on nitrogen, phosphorus and potassium percentage in cucumber leaves in 2003-2004 and 2004-2005.

Treatments		Season (2003-2004)			Season (2004-2005)		
Stimulants(S)		N	P	K	N	P	K
Without		4.26	0.25	2.39	4.34	0.25	2.44
B		4.51	0.29	2.58	4.54	0.30	2.61
Y		4.68	0.31	2.62	4.75	0.32	2.62
H		4.86	0.36	2.80	5.01	0.37	2.88
LSD at (0.05)		0.05	0.01	0.11	0.08	0.01	0.10
Nitrogen sources(N)							
NPK		4.03	0.24	2.02	4.07	0.25	2.05
FYM		4.49	0.27	2.48	4.53	0.29	2.50
CH		4.41	0.27	2.45	4.47	0.28	2.48
FYM+NPK		4.82	0.34	2.87	4.91	0.34	2.90
CH+NPK		4.64	0.33	2.83	4.79	0.33	2.86
FYM+NPK+CH		5.08	0.36	2.94	5.19	0.38	3.03
LSD at (0.05)		0.04	0.03	0.12	0.06	0.03	0.13
S*N							
NPK	Without	3.86	0.20	1.65	3.90	0.21	1.74
	B	3.82	0.25	1.99	3.84	0.25	2.01
	Y	4.10	0.25	2.10	4.20	0.26	2.02
	H	4.34	0.27	2.32	4.35	0.28	2.42
FYM	Without	4.20	0.23	2.34	4.31	0.25	2.36
	B	4.43	0.27	2.48	4.44	0.28	2.51
	Y	4.59	0.27	2.49	4.60	0.29	2.50
	H	4.72	0.30	2.59	4.75	0.33	2.62
CH	Without	4.00	0.22	2.34	4.20	0.23	2.36
	B	4.40	0.26	2.46	4.39	0.27	2.49
	Y	4.54	0.27	2.47	4.56	0.28	2.51
	H	4.69	0.32	2.53	4.71	0.33	2.55
FYM + NPK	Without	4.51	0.27	2.67	4.55	0.26	2.69
	B	4.76	0.31	2.82	4.78	0.33	2.85
	Y	4.92	0.35	2.87	4.97	0.36	2.85
	H	5.10	0.41	3.10	5.33	0.42	3.21
CH + NPK	Without	4.35	0.25	2.62	4.38	0.24	2.65
	B	4.65	0.30	2.79	4.69	0.31	2.81
	Y	4.74	0.35	2.83	4.81	0.34	2.85
	H	4.80	0.40	3.07	5.26	0.41	3.12
FYM+ NPK+ CH	Without	4.61	0.30	2.71	4.69	0.32	2.81
	B	4.99	0.34	2.92	5.10	0.36	2.97
	Y	5.20	0.35	2.93	5.33	0.38	2.99
	H	5.50	0.45	3.21	5.65	0.46	3.35
LSD at (0.05)		0.17	NS	0.19	0.18	NS	0.20

B:Bacillus subtilis Y:yeast strains H:Humic acid

Table (5): Effect of stimulants ,nitrogen sources and their interactions on nitrogen, phosphorus and potassium percentage in cucumber stems in 2003-2004 and 2004-2005.

Treatments		Season (2003-2004)			Season (2004-2005)		
Stimulants(S)		N	P	K	N	P	K
Without		2.78	0.31	4.76	2.88	0.33	4.86
B		3.09	0.34	4.95	3.25	0.37	4.92
Y		3.33	0.36	5.10	3.37	0.38	5.17
H		3.52	0.42	5.44	3.59	0.45	5.57
LSD at (0.05)		0.10	NS	0.09	0.08	0.03	0.08
Nitrogen sources(N)							
NPK		2.84	0.29	4.23	2.86	0.33	4.30
FYM		3.12	0.35	4.53	3.26	0.38	4.63
CH		3.00	0.34	4.51	3.07	0.37	4.60
FYM+NPK		3.38	0.38	5.53	3.47	0.40	5.49
CH+NPK		3.29	0.37	5.45	3.39	0.39	5.49
FYM+NPK+CH		3.44	0.41	6.14	3.60	0.43	6.27
LSD at (0.05)		0.14	0.04	0.10	0.13	0.05	0.09
S*N							
NPK	Without	2.63	0.27	4.00	2.67	0.29	4.03
	B	2.79	0.29	4.10	2.81	0.32	4.23
	Y	2.94	0.29	4.35	2.95	0.32	4.45
	H	2.99	0.31	4.47	3.01	0.38	4.49
FYM	Without	2.54	0.28	4.33	2.58	0.32	4.41
	B	3.00	0.33	4.41	3.39	0.36	4.53
	Y	3.39	0.35	4.57	3.40	0.38	4.62
	H	3.56	0.42	4.80	3.65	0.44	4.94
CH	Without	2.32	0.28	4.31	2.35	0.31	4.38
	B	2.89	0.33	4.39	2.99	0.36	4.51
	Y	3.29	0.35	4.58	3.33	0.37	4.55
	H	3.51	0.39	4.77	3.61	0.44	4.95
FYM + NPK	Without	3.10	0.33	5.10	3.23	0.35	5.35
	B	3.30	0.36	5.41	3.35	0.38	4.62
	Y	3.45	0.37	5.52	3.55	0.39	5.65
	H	3.68	0.45	6.10	3.75	0.47	6.34
CH + NPK	Without	2.87	0.32	4.95	3.01	0.35	4.99
	B	3.21	0.36	5.36	3.42	0.37	5.42
	Y	3.41	0.36	5.49	3.42	0.39	5.53
	H	3.65	0.44	5.99	3.70	0.46	6.03
FYM+ NPK+ CH	Without	3.19	0.35	5.89	3.41	0.38	5.98
	B	3.33	0.39	6.01	3.56	0.41	6.21
	Y	3.52	0.41	6.11	3.57	0.42	6.22
	H	3.71	0.48	6.53	3.84	0.50	6.65
LSD at (0.05)		0.21	NS	0.20	0.31	NS	0.23

B: Bacillus subtilis **Y:** yeast strains **H:** Humic acid.

3. Yield and its components:

Data reported in Table (6) show the effect of stimulants, nitrogen sources and their combinations on the number of fruit / m^2 Early and total yield /m^2 during the two seasons of growth . Obtained data indicate that all the yield components were significantly affected due to the application of stimulants compared with the control treatment during the two seasons of study. In this concern, the highest values of number of fruits / m^2 and total yield were obtained by using humic acid followed by yeast strains (*Saccharomyces cerevisiae* 110, *and Rhodotorula glutinis* 119,) when compared with the other treatments.

These results were true in the two seasons. In this regard, Demir *et al.* (1999), Nardi, *et al.*, (1999), and Atiyeh, *et al.*, (2002) reported similar results on studied vegetable crops. But the highest values of early yield were recorded by using yeast strains (*Saccharomyces cerevisiae* 110, and *Rhodotorula glutinis* 119,). The effect of yeast strains on early yield could be attributed to its capability to produce ethylene in the rhizosphere region of plants and meanwhile it decreased plant tissues content of Na^+, consequently resulted in an increase of the internal K^+/ Na^+ ratio, which could regulate some of the important cell activities and alleviate the plant growth inhibition caused by salinity (Dasilva *et al.*, 1974, Arshad and Frankenberger, 1989 and Makary and El-Sayed, 2000).

The combination between 50% of recommended NPK with any of tested organic manures gave the highest values of early yield. On the other hand, the highest values on the number of fruit/ m^2 and total yield /m^2 were obtained by the application of nitrogen fertilizer as33.3 % NPK + 33.3 % FYM + 33.3 % Ch as compared with the control (100% NPK mineral fertilizers). The obtained results agreed with those of Mona, *et al.*, (2005), Tarek, (2003) and Abdallah *et al*, (2006) on cucumber.

Concerning the effect of the interaction, yeast strains with 50%Ch+50% NPK mineral fertilizers was considered the best treatment as it gave the highest mean values of early yield. Whereas, humic acid combine with 33.3% FYM + 33.3% Ch + 33.3 % NPK mineral fertilizers was considered the best treatment as it gave the highest mean values on the number of fruit/ m^2 and total yield /m^2 in both seasons .

3. Fruits Characteristics:

The results of the main effect of stimulants and interactions on fruits characteristics i.e. Fruit length, Fruit diameter, fruit weight, T.S.S and macro – elements content during both seasons of study are recorded in Tables (7 and 8). In this respect, application of stimulants significantly increased all the studied fruits characteristics compared to the control (without stimulants) in both growing seasons. The highest values of physical characteristics i.e. Fruit length, diameter and weight were obtained by using yeast strains (*Saccharomyces cerevisiae* 110, and *Rhodotorula glutinis* 119,) when compared to the control. But chemical characteristics i.e. T.S.S and macro – elements content (NPK) showed the highest values by using Humic acid compared to the control. The beneficial effect of humic acid is not only due to the biological activity and soil structure, but also on the plant itself. This is due to their positive effect on the increment plant nutrients and their availability to the growing plants (El Fakharani, 1999). These results were true in both seasons and were in harmony with those reported by Makary and El-Sayed,(2000) on faba bean; Atiyeh *et al.*, (2002), Turkmen *et al.*, (2004) on tomato and El-Desuki *et al.*,(2006).

Table (6): Effect of stimulants ,nitrogen sources and their interactions on early yield total yield and number of cucumber fruit in 2003-2004 and 2004-2005.

Treatments		Season (2003-2004)			Season (2004-2005)		
Stimulants(S)		Early yield (kg/m^2)	Total yield (kg/m^2)	Number of fruit/m^2	Early yield (kg/m^2)	Total yield (kg/m^2)	Number of fruit/m^2
Without		1.77	8.38	100.29	1.94	9.09	104.02
B		2.24	9.49	109.67	2.32	10.16	112.39
Y		2.48	10.23	116.77	2.60	10.91	121.51
H		2.37	11.06	129.77	2.45	11.91	132.49
LSD at (0.05)		0.1	0.42	2.59	0.14	0.54	3.00
Nitrogen sources(N)							
NPK		1.66	8.08	88.88	1.73	8.40	91.43
FYM		1.83	8.97	102.65	1.85	9.69	105.52
CH		1.85	9.33	106.50	1.98	9.92	110.53
FYM+NPK		2.33	10.13	124.57	2.42	11.14	129.07
CH+NPK		2.91	10.56	127.99	3.10	11.31	132.12
FYM+NPK+CH		2.73	11.68	134.16	2.89	12.65	136.95
LSD at (0.05)		0.06	0.62	3.00	0.10	0.71	4.25
S*N							
NPK	Without	1.44	7.10	75.50	1.58	7.56	79.21
	B	1.65	7.99	85.90	1.75	8.33	87.20
	Y	1.78	8.56	94.20	1.80	8.69	99.10
	H	1.77	8.66	99.90	1.78	9.00	100.20
FYM	Without	1.49	7.80	88.50	1.60	8.23	92.23
	B	1.88	8.65	98.21	1.89	9.54	100.21
	Y	1.98	9.20	105.40	1.99	9.65	109.20
	H	1.95	10.22	118.50	1.90	11.32	120.42
CH	Without	1.52	8.10	90.20	1.62	8.54	95.20
	B	1.90	9.20	100.50	1.99	9.69	102.96
	Y	2.00	9.50	110.00	2.20	10.10	115.36
	H	1.99	10.50	125.30	2.10	11.36	128.60
FYM + NPK	Without	1.99	8.50	111.23	2.10	9.45	115.32
	B	2.30	9.60	120.30	2.45	10.54	125.20
	Y	2.52	10.90	126.45	2.60	11.99	130.54
	H	2.50	11.50	140.30	2.52	12.56	145.20
CH + NPK	Without	2.20	8.76	116.30	2.40	9.65	119.23
	B	2.89	9.99	122.90	2.99	10.58	126.54
	Y	3.41	11.20	128.32	3.60	12.00	134.52
	H	3.12	12.30	144.42	3.40	13.00	148.20
FYM+ NPK+ CH	Without	2.00	10.00	120.00	2.35	11.10	122.95
	B	2.81	11.50	130.20	2.82	12.30	132.21
	Y	3.20	12.00	136.24	3.40	13.00	140.32
	H	2.90	13.20	150.21	2.98	14.20	152.30
LSD at (0.05)		0.22	1.03	4.10	0.23	1.30	5.21

B:*Bacillus subtilis* **Y:**yeast strains **H:**Humic acid

Table (7): Effect of stimulants , nitrogen sources and their interactions on physical characteristics of cucumber fruit 2003-2004and2004-2005.

Treatments		Season (2003-2004)			Season (2004-2005)		
Stimulants (S)		Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)
Without		12.76	3.18	80.43	13.68	3.42	80.83
B		14.00	3.38	84.60	14.26	3.68	86.20
Y		15.16	3.94	88.60	15.39	4.16	88.90
H		14.60	3.63	87.19	14.79	3.94	87.21
LSD at (0.05)		0.56	0.06	1.35	0.46	0.06	1.4
Nitrogen sources(N)							
NPK		10.77	2.44	75.63	11.33	2.78	76.94
FYM		13.87	3.22	84.83	14.44	3.47	85.08
CH		14.12	3.38	85.33	14.63	3.61	85.31
FYM+NPK		14.94	3.80	87.18	15.08	4.07	87.53
CH+NPK		15.01	4.01	87.98	15.37	4.25	88.23
FYM+NPK+CH		16.06	4.36	90.29	16.32	4.62	91.64
LSD at (0.05)		0.61	0.04	2.22	0.63	0.06	2.52
S*N							
NPK	Without	9.00	2.20	70.00	10.20	2.54	71.60
	B	10.50	2.29	75.20	11.30	2.63	78.20
	Y	12.00	2.75	79.30	12.30	2.95	79.00
	H	11.56	2.50	78.00	11.50	3.00	78.95
FYM	Without	12.20	2.80	79.90	13.70	3.00	80.11
	B	14.00	3.10	83.30	14.33	3.50	85.30
	Y	14.95	3.59	88.90	15.20	3.78	87.90
	H	14.32	3.40	87.23	14.51	3.60	87.00
CH	Without	12.70	2.95	80.20	13.93	3.21	80.23
	B	14.07	3.20	84.00	14.20	3.33	86.00
	Y	15.22	3.90	89.20	15.56	4.00	88.50
	H	14.50	3.45	87.90	14.82	3.90	86.50
FYM + NPK	Without	13.89	3.50	83.00	14.20	3.66	83.20
	B	14.80	3.69	87.20	14.60	3.98	87.40
	Y	15.88	4.10	90.00	16.00	4.42	91.00
	H	15.20	3.90	88.50	15.52	4.20	88.50
CH + NPK	Without	13.90	3.72	84.56	14.52	3.90	83.90
	B	14.65	3.82	87.90	14.99	4.10	88.00
	Y	16.00	4.50	90.56	16.30	4.80	92.00
	H	15.50	4.00	88.90	15.68	4.20	89.00
FYM+ NPK+ CH	Without	14.88	3.90	84.90	15.50	4.20	85.95
	B	15.95	4.20	90.00	16.11	4.52	92.30
	Y	16.88	4.80	93.65	16.99	5.00	95.00
	H	16.52	4.53	92.60	16.69	4.75	93.30
LSD at (0.05)		1.38	0.14	3.30	1.13	0.15	3.35

B:Bacillus subtilis Y:yeast strains H:Humic acid

Table (8): Effect of stimulants , organic treatments and their interactions on chemical characteristics of cucumber fruit 2003-2004and2004-2005

Treatments		season (2003-2004)				season (2004-2005)			
Stimulants(S)		**T.S.S**	**N**	**P**	**K**	**T.S.S**	**N**	**P**	**K**
Without		3.88	2.24	0.23	4.38	3.86	2.28	0.23	4.45
B		4.01	2.79	0.24	4.60	4.02	2.86	0.24	4.67
Y		4.20	2.95	0.25	4.65	4.18	2.87	0.25	4.72
H		4.35	3.18	0.27	4.80	4.31	3.26	0.27	4.95
LSDat(0.05)(S)		**0.10**	**0.08**	**NS**	**0.11**	**0.11**	**0.09**	**NS**	**0.12**
Nitrogen sources(N)									
NPK		4.57	2.21	0.22	3.98	4.53	2.30	0.23	4.10
FYM		3.92	2.73	0.24	4.34	3.89	2.60	0.25	4.36
CH		3.84	2.51	0.25	4.30	3.77	2.58	0.24	4.34
FYM+NPK		4.37	3.09	0.26	4.94	4.35	3.13	0.26	5.06
CH+NPK		4.27	3.07	0.25	4.87	4.33	3.11	0.25	5.04
FYM+NPK+CH		3.70	3.14	0.27	5.23	3.69	3.21	0.27	5.29
LSD at (0.05)		**0.14**	**0.09**	**0.01**	**0.18**	**0.16**	**0.09**	**NS**	**0.19**
S*N									
NPK	**Without**	4.36	2.11	0.20	3.78	4.32	2.23	0.22	3.88
	B	4.45	2.19	0.21	3.89	4.41	2.30	0.23	3.99
	Y	4.68	2.22	0.22	4.12	4.62	2.31	0.23	4.21
	H	4.80	2.32	0.24	4.14	4.78	2.35	0.24	4.30
FM	**Without**	3.62	2.23	0.22	4.08	3.60	2.25	0.22	4.09
	B	3.80	2.27	0.24	4.37	3.78	2.36	0.24	4.39
	Y	4.00	3.10	0.24	4.38	3.98	2.37	0.26	4.39
	H	4.25	3.31	0.26	4.51	4.21	3.41	0.28	4.55
CH	**Without**	3.57	2.22	0.22	4.04	3.52	2.26	0.23	4.11
	B	3.69	2.25	0.25	4.32	3.64	2.34	0.22	4.36
	Y	3.99	2.29	0.24	4.34	3.90	2.34	0.24	4.37
	H	4.10	3.29	0.27	4.48	4.00	3.38	0.25	4.52
FM + NPK	**Without**	4.20	2.29	0.24	4.78	4.11	2.32	0.24	4.86
	B	4.31	3.34	0.25	4.89	4.35	3.38	0.25	4.99
	Y	4.40	3.36	0.26	4.90	4.42	3.39	0.26	5.05
	H	4.55	3.38	0.28	5.20	4.52	3.41	0.29	5.35
CH + NPK	**Without**	4.00	2.27	0.22	4.75	4.10	2.29	0.23	4.84
	B	4.21	3.30	0.24	4.85	4.32	3.34	0.24	4.98
	Y	4.35	3.33	0.25	4.87	4.39	3.38	0.25	4.99
	H	4.51	3.36	0.29	4.99	4.50	3.41	0.26	5.34
FM+ NPK+ CH	**Without**	3.50	2.32	0.25	4.84	3.52	2.35	0.25	4.91
	B	3.60	3.39	0.26	5.27	3.62	3.42	0.27	5.31
	Y	3.79	3.41	0.27	5.31	3.76	3.45	0.28	5.31
	H	3.89	3.44	0.29	5.48	3.84	3.60	0.29	5.62
LSDat(0.05) S*O		**0.30**	**0.19**	**NS**	**0.22**	**0.28**	**0.15**	**NS**	**0.23**

B:*Bacillus subtilis* **Y:**yeast strains **H:**Humic acid

Concerning the effect of nitrogen fertilization source, the obtained data show that application of the combination between33.3% NPK +33.3% FYM + 33.3% Ch to the cucumber plants, gave higher values of measured physical and chemical fruit parameters.

The enhancing effect of organic manure on mineral composition may be attributed to improving the soil physical, chemical and biological properties. preparing the suitable bed for germination and development of plant growth, decreasing soil pH and supplying the plant with slow released of N, P, K and micronutrients during the active absorption period of vegetative growth which ensures enough concentration of the available nutrients required (Sawan and Mostafa, 2002 and Nassar, *et al.*, 2004)

These results were true in both seasons and were in harmony with those reported by Tarek (2003) and Mona *et al.*, (2005) on cucumber. Moreover, inoculation of cucumber plants with yeast strains (*Saccharomyces cerevisiae* 110, and *Rhodotorula glutinis* 119,) combined with 33.3% FYM + 33.3% Ch +33.3% inorganic fertilizers, induced significant favorable effects on physical characteristics, but Humic acid combined with 66.6% organic nitrogen (FYM+Ch) + 33.3% inorganic fertilizers gave the highest values of chemical characteristics of cucumber fruits during the two seasons.

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تأثير بعض المنشطات ومصادر النيتروجين والتفاعل بينهما على النموالخضري والمحصول وجودة ثمار نباتات الخيارالنامية فى الصوب تحت الظروف الملحية

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اجريت تجربتان حقليتان خلال موسمى الزراعة ٢٠٠٣/٢٠٠٤ و٢٠٠٤/٢٠٠٥ لدراست تاثير استخدام المحسنات ومصادر النيتروجين والتفاعل بينهما على النموالخضرى والمحصول وجودة الثمار لنبات الخيار(صنف هشام). ادى استخدام المحسنات وهى *Bacillus Subtilis* وسلالتين من الخمائر (*Saccharomyces cerevisiae* 110 *Rhodotorula glutinis*119) وحامض الهيومك الى زيادة النموالخضرى لنباتات الخيار معبرا عنه بارتفاع النباتات وعدد الاوراق وزيادة النسبة المئوية لعنصر النيتروجين والفوسفور والبوتاسيوم فى الساق والاوراق والمحصول المبكر والكلى وصفات الجودة للثمار(طول الثمرة، قطر الثمرة، وزن الثمرة، عدد الثمار فى المتر المربع، المواد الصلبة الكلية والنسبة المئوية لعنصر النيتروجين والفوسفور والبوتاسيوم). وكذلك ادى استخدام سماد الماشية + سمد الدواجن + السماد المعدنى الى الحصول على اعلى نموخضرى لنباتات الخيار معبرا عنه بارتفاع النباتات وعدد الاوراق وزيادة النسبة المئوية لعنصر النيتروجين والفوسفور والبوتاسيوم فى الساق والاوراق والمحصول المبكر والكلي وصفات الجودة للثمار(طول الثمرة، قطر الثمرة، وزن الثمرة، عدد الثمار فى المتر المربع، المواد الصلبة الكلية والنسبة المئوية لعنصر النيتروجين والفوسفور والبوتاسيوم) . بينما اعطى السماد المعدني فقط(١٠٠% الموصى به) الى الحصول على اقل قيم للصفات المدروسة.ولقد حقق التاثير المتداخل لكلامن حامض الهيومك مع ٣٣,٣% سماد الماشية +٣٣,٣% سمد الدواجن +٣٣,٣% السماد المعدني الى الحصول على اعلى قيم من النموالخضرى لنباتات الخيار معبرا عنه بارتفاع النباتات وعدد الاوراق وزيادت النسبة المئوية لعنصر النيتروجين والفوسفور والبوتاسيوم فى الساق والاوراق والمحصول المبكر والكلى وصفات الجودة للثمار(طول الثمرة، قطر الثمرة، وزن الثمرة، عدد الثمار فى المتر المربع، المواد الصلبة الكلية والنسبة المئوية لعنصر النيتروجين والفوسفور والبوتاسيوم).