EFFECT OF DIFFERENT LEVELS OF COMPOST ON YIELD, MICROORGANISMS AND QUALITY OF CUCUMBER GROWN UNDER PLASTIC HOUSES CONDITIONS

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Abstract

A field experiments has been conducted during 2003 and 2004 seasons under protected cultivation at Sakha Greenhouse Station, Kafr El-Sheikh to study the impact of different compost levels (crop residuals) on growth, productivity and quality of cucumber as well as their effect on damping-off caused by *pythium ultimum, fusarium solani* and *sclerotinia clerotiorum.* The applied compost levels were 0.68, 1.36, 2.05, 2.73 and 3.41 kgs/m^2, while the control treatment was cattle manure fertilizer. The obtained results can be summarized as follows:

Application of compost increased the values of most studied characters as compared to the manure organic fertilizer. Obtained results revealed that the compost levels of 1.36 and 2.05 kgs/m^2 recorded the best results of the plant growth, i. e. stem length, leaf area, number of branches and leaves, total chlorophyll as well as fresh and dry weight followed by the compost levels of 0.68, 2.73 and 3.41 kgs respectively. Data also showed that the highest increases in cucumber yield, number of fruits, diameter and length of fruits had been achieved when compost with 1.36 or 2.05 kgs/m^2 were applied.

Application of 0.68 and 2.05 kgs/m^2 compost gave maximum protection against post emergence damping-off and reduced the disease incidence to 7.5 and 11.25% respectively, compared with the fungicide Topsin M_{70} 1.25%. While, the compost levels of 2.73 & 3.41 kgs gave less effect in this respect. The levels of compost (0.68 & 1.36 kgs) were most effective in controlling powdery and downy mildew diseases from 55.98 & 40.58% to 29.84 & 21.39% respectively, while higher levels (2.73 & 3.41 kgs) were least. The applied fungicides had the best effect on reducing powdery and downy mildew diseases severity being 10.38 & 9.23% respectively.

INTRODUCTION

Cucumber represents one of the important and economic vegetable crops in Egypt under plastic-house cultivation, it is exposed to various plant diseases i.e soil borne diseases (damping-off and root-rot) *fusarium spp, pythium ultimium* and *sclerotinia sclerotiorum* and air borne diseases (powdery and downy mildew) affecting plant stand causing great losses in cucumber fruit yield (*Zang et al. 1996)* stated that peroxidase activity a putative marker of systemic acquired resistance (SAR) in cucumber was significantly enhanced in plant growth in compost amended mixes. The activity of peroxidase isozyne in cucumber plants was greater when plants were grown in compost as well as after inoculation with *Pythium spp and anthracnose colletotrichum orbiculare* than is grown with or without prior inoculation. The interaction of compost and the pathogen appeared critical for rapid activation of S.A.R. associated gene expression in cucumber plants.

Several reports suggested that compost may alter resistance of plants to disease. *Trankner, (1992)* observed that powdery mildew of wheat and barley was less sever with compost application in: amended than in unamended soils. *Roe et al., (1993)* reported lower incidence of early blight and bacterial spot of tomato on plants grown in compost-amended soil than in the control.

Zhang et al., (1998) found that a bio-control agent-fortified compost mix, suppressive to several diseases caused by soil borne plant pathogen, induced systemic acquired resistance (SAR) in cucumber against anthracnose caused by *Colletrichum orbiculare* and in Arabiolopsis against bacterial speck caused by *P. Syringae*.

Tuitert et al., (1998) found that, compost from two commercial composting facilities suppressed growth of *R. Solani* in potting mixtures with 20% of the product when the compost was fresh. The effect on suppressiveness depends on curing time and origin of the compost.

Utkheda et al., (1999) stated that under green house conditions *B. subtilis* was antagonistic to pythium aphanidermatum. Spray application of Tricoderma harzianum reduced severity of cucumber powdery mildew in green house. The mode of action of *T. harzianum* in powdery mildew control was obtained through induced resistance *(Elad et al., 1998).*

Ben-Yephet and Nelson (1999) tested, compost type (municipal bio-solids (MC) and leaves (LC) at doses (40,80,160,320 mg/cm^3) on suspension of damping-off different hosts. In dose-response experiments, LC was suppressive at dosage rates 80mg compost/cm^3 of sand, where as MC was suppressive at a rates of 80 mg/cm^3. Both composts significantly suppressed damping-off caused by *pythium spp.* i.e *p.irrgulare* 85 % suppression in MC and 60 % suppression in LC. Under these conditions, LC significantly suppressed damping-off of cucumber seedlings by *P. aphenidermatum* (20% suppression) or *P. myriotylum* (37% suppression). Increasing productivity and improving fruit quality of cucumber, tomato pepper and cantaloupe are mainly depended on using healthy and high quality seedlings. Plant growth is affected by physical and chemical properties of media substrates.

Abo Hussin, (2001) using chicken and compost manure reported that such fertilizers at different levels increased plant vegetative growth expressed as plant height, number of leaves and branches as well as dry matter of plant foliage. *El-Sheikh et al., (1993)* showed that adding chicken manure at the rate 45 kgs/540 m^2 at each irrigation significantly resulted in higher yield than the chemical fertilizer treatments. They added that, the increase in total yield due to injected extract of chicken manure at 45 kgs per 540 m^2 each irrigation was 20.7% over the control (chemical fertilizer),. The increase in crop productivity, though less marked and less immediate than that obtained with the addition of mineral fertilizers, has been found to be longer-lasting, probably due to more progressive release of the nutrients. A further effect observed is a particular stimulation of root growth. The positive effects of some composts have been found to diminish at higher dosages due to the onset of phytotoxic effects *(Chu and Wong, 1984, Wang et al., 1984).*

Stanely, (1991) indicated that the size of individual units of cucumber can be significantly potential, market selection and final use. He added that size may be determined by one of three general means: (1) Dimension (length, width, diameter (2) Weight (3) Volume,

Eissa, (1996) reported that adding organic manures from different sources, viz., cattle, CM or PM at the rate of 20 kgs/row (9 m long) significantly increased cucumber fruit yield. CM or PM showed the highest values in this respect. On the other hand, the highest uptake values of N.P and Fe were associated with PM application, while higher K uptake was associated with the addition of CM.

Aly, (2002) studied the effect of applying organic and chemical fertilizers on cucumber yield and fruit characteristics. He found that the organic treatment (10 m3 compost) gave significantly greater early, exportable and total yield than inorganic (chemical) treatment. He also added that average fruit weight, length, diameter, length / width ratio, fruit firmness, T.S.S., total sugars, chlorophyll and ascorbic acid content were significantly increased by using compost of organic materials over the inorganic treatment.

The objective of this study was to investigate the response of cucumber growth, productivity, quality and microorganism incidence to compost as alternative of organic fertilizer.

MATERIALS AND METHODS

The experiment was carried out under plastic-houses conditions at the protected agriculture location, Sakha during the two successive spring seasons of 2003 and 2004 to study the effect of different compost levels on growth, productivity and quality of cucumber plants in addition to their effect on disease control i.e wilt or root rot *(F. oxysporium, F. Solani, Pythium ulyimum and sclerotinia sclerotioum).* Besides, these fungi were isolated from diseased cucumber plants, powdery and downy mildew disease severity to improve their growth, flowering, fruit yield and quality.

The chemical and physical properties of the experimental soil were determined before planting, data is shown in Tables 1 and 2.

Table 1. Soil physical analysis

Season	Texture	Sand, %	Silt, %	Clay, %
2003	Clay	32.4	29.8	37.8
2004	Clay	33.4	28.2	38.4

Table 2. Soil chemical analysis

Season	PH	EC	N	P	K	S	Na	Ca	Mg	Fe	Zn	Mn	Cu	Caco3
			PPm											
2003	7.6	3.42	70	64	1312	14.6	2.95	8	4.2	18.2	1.6	8	11	2.2
2004	7.9	4.37	50	100	1472	12	2.71	7	2.4	14.0	1.9	7.6	10.4	3.1

Cucumber hybrid F_1 delta star seeds were sown on 15 th of January in seedling trays (40, 67x6 cm) filled with a mixture of 50% peat and 50% vermiculate V/V. Each 50 kgs of the mixture were fertilized with 150 gms ammonium nitrate (33.5%N), 300 gms superphosphate (15.5% P_2O_5), 100 gms potassium sulphate (48% K_2O), 16 gms magnesium sulphate (16 % MgO_2) and 4000 gms calcium carbonate. In addition to 25 gms of penlet fungicide were also applied to each 50 kgs of the mixture.

All seedlings were sprayed twice with 1 g/L foliar fertilizer (Kristalon) after one and two weeks from sowing. A complete randomized blocks design was used. The experiment treatments which were used in this study (media mixtures) for seedlings production were as follows:

1- Cattle manure (control).
2- A 0.68 kgs compost per m^2.
3- A 1.36 kgs compost per m^2.
4- A 2..05 kgs compost per m^2.
5- A 2.73 kgs compost per m^2.
6- A 3..41 kgs compost per m^2.

Treatment with fungicides:

a- Root-rot with disease:

Seedlings, 30 days-old were soaked into Topsin M_{70} (3 g/L) for 15 minutes.

b- Powdery and downy mildew:

The plants received the first spray as soon as infection signs appeared. Domark was used at the rate of 50 cm/100L against powdery mildew and aqua gene pro was used at the rate 45 g/100L against downy mildew.

The chemical analysis of the compost were accomplished on the dry weight basis at the environmental, Water and Soil Research Institute and the data is summarized in Table 3.

Table 3. Compost chemical analysis

Chemical analysis	
Weight of m^3	100 kgs
Moisture	13.2%
PH (1:10)	6.31
EC (1:10)	0.95 ds/m
Total Nitrogen	0.53%
Ammonium nitrogen	113.0 ppm
Nitrate nitrogen	-
Organic matter	95.01%
Organic carbon	55%
Ash	4.99
C:N ratio	104:1
Total phosphorus	0.05%
Total potassium	0.45%
Water saturation percentage	1000

Four weeks after seed sowing, seedlings were transplanted in an unheated plastic-house (55×16×3.5 m) which was prepared according to the common practices. The plastic-houses had been divided into ten raised ridges for cultivation. Each bed was 100 cm wide, 60 m long, 20 cm high and 50 cm apart. Cucumber seedlings were transplanted at a spacing of 50 cm using double row on each ridge. The treatments were arranged in complete randomized blocks design with five replicates, each plot had 15 plants. Agricultural practices, managements and fertigation were carried out as recommended by Ministry of Agriculture, Egypt.

Vegetative growth characters were recorded after 65 days from transplanting using five plants of each treatment per plot for: plant height (cm), no. of leaves per plant, no. of branches per plant , leaf area (cm^2) and total chlorophyll content %. Fruit yields per plant were recorded every two days respectively. Data of the two experiments were statistically analyzed.

Chlorophyll content in cucumber leaves were determined in the fifth leaf from the growing tip of 10 plants by a spectrophotometer by using N, N-Dimethyl formamide according to the methods *Moran (1982).*

RESULTS AND DISCUSSION

1. Plant growth:

Data listed in Table 4 represent the effect of different levels of compost on plant growth during the two successive seasons of 2003 and 2004. It could be noticed that application of the compost with a rate of 2.05 kgs/m^2 to cucumber plants increased vegetative growth characteristics expressed as stem length, leaf area, number of branches and leaves per plant as well as fresh and dry matter percentage for leaves and stems per plant compared to the other fertilizer treatments. Thus, the compost level of 2.05kgs/m^2 recorded the highest values of the vegetative growth of cucumber plants during the two seasons of 2003 and 2004.These results may be due to organic manures support of the number of leaves, fresh and dry matter % of plant through the stimulation effect on the meristematic activity of tissues, where these organic manures are rich in NPK and other nutrients which are compulsory for plant growth.

Data presented in the same Table revealed that, the compost level of 3.41 kgs/m^2 recorded the least effect on cucumber growth i.e. stem length, leaf area, number of branches and leaves in addition to fresh and dry weight per plant. There were no significant differences between the compost level of 3.41kgs/m^2 and the control treatment.

Generally, the compost level of 2.05 kgs/m^2 (plastic-house area) achieved the best growth parameters of cucumber plants followed by the compost levels of 1.36, 0.68 and 2.73 kgs/m^2 but, the compost level of 3.41 kgs/m^2 and the control treatment (inorganic fertilizer) gave the lowest values of growth parameters for cucumber production under unheated plastic-houses conditions. Finally, it could be concluded that using compost in the media of cucumber production resulted in enhancement of plant growth which was better than the control. The obtained results agreed with those of *(Sawan et al., 1999).*

Table 4. Effect of the different rates of compost on vegetative growth cucumber plants in of 2003 and 2004 seasons

Treatments	Stem length, cm		Leaf area, dm^2		No. of branches, / plant		No. of leaves / plant		Fresh weight gms/plant		Dry weight gms/plant	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	339	261	187	117	7.3	4.777	56.9	39.8	940.0	599.9	83.8	55.7
0.68 kgs	350	274	215	140	7.8	4.767	62.4	43.0	993.3	663.5	96.9	58.2
1.36 kgs	359	279	222	146	8.7	5.110	63.6	45.1	1040.0	685.7	106.6	70.2
2.05 kgs	366	289	236	159	9.6	5.750	66.4	49.3	1153.3	808.8	132.3	88.6
2.73 kgs	339	271	210	136	7.6	4.5	61.4	40.9	976.7	635.2	86.8	56.7
3.41 kgs	291	245	184	115	5.4	4.4	55.4	38.9	930.0	556.56	86.10	53.78
L.S.D 0.05	12.73	12.73	12.09	8.81	2.89	0.75	15.03	4.67	200.34	101.56	16.60	12.46

2. Yield:

Data presented in Table 5 show the effect of different levels of compost on total yield of fruits and number of fruits. The highest fruit yield 4.354 kgs/plant or 11.117 kgs/m^2 were produced by fertilizing cucumber with compost at 2.05 kgs/m^2 followed by fertilizing the plant with 1.36, 0.68, 2.73 and 3.41 kgs/m^2 during 2003 season. Data also indicated that increasing or decreasing the compost level than 2.05 kgs/m^2 tended to decrease the total yield of fruits during 2003 and 2004 seasons. Meanwhile, the treatment which received 3.41kgs per m^2 recorded the minimum total yield of fruits 2.188 kgs/plant or 5.47 kgs/m^2 compared with the other compost treatments during 2004 season. However, the number of fruits per plant and number of fruits per m^2 were similar in terms of the total yield where, the compost level of 2.05 kgs recorded the highest number of fruits and productivity of cucumber compared with the other compost levels of 0.68, 2.05, 2.73 and 3.41 kgs/m^2.

Table 5. Effect of the different rates of compost on fruit yield and number of cucumber plants in 2003 and 2004 seasons.

Treatments	Yield, kgs/plant		Yield, kgs/m^2		No. of fruits/plant		No. of fruits/m^2	
	2003	2004	2003	2004	2003	2004	2003	2004
Control	2.722	2.256	6.805	5.640	25.007	21.703	62.517	54.260
0.68 kgs	3.557	2.627	9.847	6.817	33.62	28.586	92.517	71.473
1.36 kgs	3.852	2.886	10.380	7.217	36.297	31.117	102.03	82.193
2.05 kgs	4.354	3.245	11.117	8.113	42.182	36.309	116.46	96.277
2.73 kgs	3.393	2.23	9.183	6.210	32.110	25.877	89.270	64.693
3.41 kgs	3.281	2.188	8.450	5.470	34.397	18.943	83.993	47.357
L.S.D. 0.05	0.37	0.355	1.181	1.390	2.601	3.841	4.001	5.604

It could be concluded that in order to produce higher total fruit yield of cucumber plants compost at rate of 2.05 kgs/m^2 could be applied. The increase in total produced yield, might be due to the function of the increase in the vegetative growth and dry matter contents of the plant and turn to the increase in first number one and average fruit weight. Similar findings were obtained by *(Eid et al., 1997).*

3. Cucumber quality:

Table 6 shows the quality of cucumber fruits as affected by different levels of compost for 2003 and 2004 seasons. The results show that the compost levels had a significant influence on the average length and diameter of fruit as well as dry matter percentage and total soluble solids (T.S.S) percentage during the two seasons of 2003 and 2004. It can be concluded that the maximum values of dry matter, and T.S.S, as well as fruit length and diameter have been obtained with the compost levels of 1.36

and 2.05 kgs/m². While, the compost level of 3.41 kgs/m² recorded minimal values of quality parameters during the two seasons of 2003 and 2004 respectively.

Table 6. Effect of the different rates of compost on cucumber quality during 2003 and 2004 seasons

Treatments	Fruit length, cm		Fruit diameter, cm		Dry matter, %		T. S.S %	
	2003	2004	2003	2004	2003	2004	2003	2004
Control	15.627	17.733	3.287	3.050	4.133	3.343	3.733	3.467
0.68 kgs	16.500	17.933	3.860	3.198	4.460	3.800	4.300	3.633
1.36 kgs	17.040	18.133	4.183	3.533	4.870	3.627	4.733	3.933
2.05 kgs	18.913	18.800	4.827	3.933	5.367	3.910	5.200	4.267
2.73 kgs	16.433	17.800	3.653	3.067	4.170	3.377	3.833	3.667
3.41 kgs	14.543	16.333	3.127	3.933	3.733	3.127	3.600	3.333
L.S.D. 0.05	1.146	0.884	0.330	0.337	0.371	0.211	0.393	0.539

The data listed in Table 6 demonstrated that the compost level of 2.05 kgs/m² improved the quality of cucumber fruits such as fruit length and diameter, dry matter and T.S.S followed by the compost levels of 1.36, 0.68, 2.73and 3.41 kgs/m² for the two seasons.

So, the most suitable treatment for fertilizing cucumber plant was to use compost at a level of 2.05 kgs/m² to produce fruits with good physical quality of cucumber. This increase in physical fruit quality might indicate that applying compost increased the up take of macro- and micro nutrients necessary for plant growth and fruit development requirements.

4. Total chlorophyll:

Results reported in Table 7 showed that the highest amounts of chlorophyll a, b and total chlorophyll content of cucumber plants were obtained from the plants which were fertilized with compost at the level of 2.05 kgs/m² in the two seasons of 2003 and 2004. Mean while, the lowest quantities of chlorophyll a, b and total chlorophyll (a + b) were resulted from the leaves of plants which were fertilized with compost at the level of 3.41 kgs/m².

However, increasing or decreasing the compost applied to cucumber plants than 2.05 kgs/m² tended to decrease their chlorophyll content during the two different seasons of 2003 and 2004. In this regard, composted organic materials contain considerable amounts of macronutrients such as nitrogen, phosphorus and micronutrients, i. e. Fe, Mn and Mg that contribute to chlorophyll synthesis in plant.

Table 7. Effect of the different rates of compost on chlorophyll contents of cucumber leaves in 2003 and 2004 seasons

Treatments	Chlo. a u / cm^2		Chlo. b u / cm^2		Total Chlo. u / cm^2	
	2003	2004	2003	2004	2003	2004
Control	45.570	41.46	11.66	10.63	55.10	50.90
0.68 kgs	50.263	46.66	13.16	10.95	60.83	57.09
1.36 kgs	52.53	50.13	14.01	11.36	63.74	59.84
2.05 kgs	59.50	52.34	15.21	11.99	67.48	62.54
2.73 kgs	46.527	45.72	16.99	13.10	59.54	52.37
3.41 kgs	43.363	40.15	11.33	10.51	53.35	47.29
L.S.D. 0.05	5.642	5.21	1.714	1.746	8.656	6.530

5. Post-emergence damping-off cucumber plants:

The results presented in Table 8 show that, all treatments used for compost application differed significantly in their effect. Increasing compost levels increased the percentage of post-emergence damping-off and decreased the percentage of survival plants and the loss of yield was also increased. The aim of fertilizer was to increase the natural hit ness of cucumber plants to disease infection, if we consider plant nutrition one of the possibilities enhancing other control measures against a given pathogen and can incorporate into the integrated control systems.

Data also revealed that, adding 0.68 and 1.36 Kgs compost to the soil gave the lowest percentage of post-emergence damping-off (10and 12.5%), also adding 2.73 and 3.41 Kgs compost to the soil were less effective in reducing the diseases incidence and gave (25-30 %) damping-off, when compared with (35%). The level of compost (2.05 Kgs) fell in between Topsin M_{70} fungicide application had the best effect in reducing the percentage of damping-off in 2003 and 2004 were 2.5 and 0.0 % respectively. The interaction of compost and the pathogen appeared critical for rapid activation of S.A.R. associated gene expression in cucumber plants *(Zang et al., 1996)*. compost from two commercial composting facilities suppressed growth of *R.Solani* in potting mixtures with 20% of the product when the compost was fresh. The effect on suppressiveness depends on curing time and origin of the compost *(Tuitert et al., 1998)*.

Table 8. Effect of different levels of compost fertilizer on post-emergence damping-Off cucumber plants under plastic-houses conditions at Sakha site

Compost, kgs	Season 2003		Season 2004	
	Post-emergence Damping-off, %	Survival, %	Post-emergence Damping-off, %	Survival, %
0.68 kgs	10.0	90.0	5.0	95.0
1.36 kgs	12.5	87.5	10.0	90.0
2.05 kgs	20.0	80.0	12.5	87.5
2.73 kgs	25.0	75.0	17.5	82.5
3.41 kgs	30.0	70.0	25.0	75.0
Topsin M70	2.5	97.5	0.0	100.0
Control	35.0	65.0	30.0	70.0
L.S.D at 5%	4.25	5.32	3.98	5.72

The results obtained in season 2004 were more or less similar to those obtained during season 2003. These results are in line with those obtained by *Ben-Yephet and Nelson (1999)* who found that, compost type municipal biosolids (MC) and levelers (LC), and compost dose (40,80,160,320 mg/cm^3) induced suppression of damping-off caused by different *pythium* isolates obtained from different hosts. Indose-response experiments, LC was suppressive at dosage rates 80 mg compost/cm^3, MC was suppressive at rates 40 mg compost/cm^3 . Both composts significantly suppressed damping-off caused by *pythium spp.* (approximately 60 % suppression in both composts).

6. Disease severity of powdery and downy mildew:

Data presented in Table 9 indicated that, the fungicides (Domark and Aqua genepro) application had the best effect on reducing powdery and downy mildew disease severity to be 6.8 & 15.62 % in season 2003 and 13.95 & 2.84 % in season 2004 respectively, these were correlated by substantial increase in the yield. All the levels tested of compost differed significantly in their response to powdery and downy mildew infection increasing compost levels increased the disease severity infection in both powdery and downy mildew disease. Data also revealed that, compost level 0.68 kgs showed the lowest percentage of infection in powdery and downy mildew disease 23.25 & 28.28%, while the highest percentage of infection was observed with level 3.41 kgs it 57.50 & 56.49 % .The difference between the two levels was significant, when compared to control (54.62 & 60.50 % respectively). The other treatments of compost levels were fell in between. The results obtained at 2004 season were more or less similar to those of the results obtained during 2003.

Tabal 9. Effect of different levels of compost fertilizer on disease severity (%) of powdery and downy mildew disease under plastic-houses condition at Sakha site

Compost, kgs	Disease severity, (%)			
	Season 2003		Season 2004	
	Powdery mildew	Downy mildew	Powdery mildew	Downy mildew
0.68 kgs	23.25	28.28	36.42	14.50
1.36 kgs	32.24	38.28	39.25	15.72
2.05 kgs	37.29	46.05	42.69	15.83
2.73 kgs	42.67	53.25	47.75	17.25
3.41 kgs	57.50	56.49	74.50	23.75
Fungicide	6.80	15.62	13.95	2.84
Control	54.62	60.50	57.34	20.66
L.S.D at 5%	5.02	10.42	7.94	3.27

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تأثير مستويات مختلفة من الكمبوست على كمية المحصول وجودته ومقاومة بعض الأمراض التى تصيب محصول الخيار تحت الصوب

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تعتبر أمراض عفن الجذور والبياض الدقيقى والزغبى من الأمراض واسعة الانتشار فى مصر فى الصوب وقد اجرى هذا البحث لدراسة تأثير مستويات الكمبوست المختلفة (المخلفات النباتية) وهى ٠,٦٨ و ١,٣٦ و٢,٠٥ و٢,٧٣ و ٣,٤١ كج كمبوست/ م^2 على هذه الأمراض وأيضا على جودة وإنتاجية محصول الخيار خلال موسمى ٢٠٠٣ و ٢٠٠٤ .

ويمكن تلخيص نتائج البحث المتحصل عليها فيما يلى:

١- إضافة سماد الكمبوست بمعدل ٢,٠٥ كم/ م٢ أعطى أعلى معدلات النمو الخضري لنبات الخيار " طول النبات – مساحة الورقة – عدد الأفرع لكل نبات – عدد الأوراق لكل نبات – الوزن الطازج والجاف لكل نبات" مقارنة بمستويات الكمبوست الأخرى.

٢- أعطى معدل التسميد العضوى من الكمبوست ٣,٤١ كجم/ م٢ وأيضا استخدام السماد العضوى البلدى فقط (كنترول) أقل معدلات النمو الخضرى لنبات الخيار مقارنة بمستويات الكمبوست الأخرى.

٣- كان لإضافة السماد العضوى من الكمبوست بمعدل ٢,٠٥ كجم/ م^2 أثرا إيجابياً فى زيادة المحصول الكلى من الخيار وعدد الثمار لكل نبات، بينما سجل معدل التسميد العضوى من الكمبوست ٣,٤١ كجم/ م^2 أقل إنتاجية لمحصول الخيار يليه التسميد العضوى البلدى(كنترول).

٤- أدى إضافة السماد العضوى من الكمبوست بمعدل ٢,٠٥ كجم/ م^2 أفضل صفات لثمرة الخيار (طول الثمرة – قطر الثمرة – وزن المادة الجافة – المواد الصلبة الذائبة) بالإضافة لمحتوى الثمرة من الكلوروفيل يليها المستويات ١,٣٦ ، ٠,٦٨ ، ٢,٧٣ والكنترول ٣,٤١ كجم/ م^2.

٥- تم الحصول على أعلى معدلات من النمو الخضرى لمحصول الخيار " طول النبات – مساحة الورقة – عدد الأفرع / نبات – عدد الأوراق / نبات – الوزن الطازج والجاف" وإنتاجية المحصول وصفات الثمار خلال موسم ٢٠٠٤ مقارنة بالموسم الزراعى ٢٠٠٣ وذلك عند جميع مستويات التسميد العضوى من الكمبوست المستخدمة.

٦- مستويات الكمبوست ٠,٦٨ و ٢,٠٥ كجم أعطت أعلى حماية ضد أمراض التربة (**بيثيم، أولثيم، فيوزاريوم سولاى، اسكليرونينا، اسكليروثيورم**) وأدى ذلك الى خفض التأثير

المرضى لنباتات الخيار من ٣٥ ٪ الى ٧,٥ ٪ و ١١,٢٥ ٪ على التوالى بينما أعطى المبيد الفطرى توبسن أعلى تأثير فى هذا الخصوص (١,٢٥٪) لكن المستويات الأعلى من ذلك أعطت تأثيرا اقل.

٧- كانت مستويات الكمبوست ٠,٦٨، ١,٣٦ كج/ م٢ أكثر تأثيرا فى مقاومة أمراض البياض الدقيقى والزغبى وادت الى خفض الشدة المرضية من ٥٥,٩٨ ٪ و ٤٠,٥٨ ٪ الى ٢٩,٨٤ ٪ و ٢١,٣٩ ٪ على التوالى بينما المستويات الاعلى من ذلك ٢,٧٣ و ٣,٤١ كج كانت اقل تأثيرا فى هذا الخصوص. بينما أعطت المبيدات المستخدمة دومارك و اكواجين برو احسن تأثيرا فى خفض الشدة المرضية على نباتات ١٠,٣٨ ٪ و ٩,٢٣ ٪ على التوالى.