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INFLUENCE OF DIFFERENT ORGANIC FERTILIZERS, EFFECTIVE MICROORGANISMS (EM) AND SLOW RELASE FERTILIZER ON GROWTH, YIELD AND QUALITY OF SWEET PEPPER PLANTS UNDER GREEN HOUSE

Farrag, Amal M.*; M.M.Shaheen*; S.M. Kabeel and M.S.Mohamed **

*** Vegetable Department, Faculty of Agriculture , Cairo University.**

****Veg. Res. Dept. Hort. Inst.,Cairo,Egypt.**

ABSTRACT

Two experiments were carried out during two successive seasons of 2006-2007 and 2007-2008 at Kaha Experimental Station, Kaluobia Governorate. Horticultural Research Institute on pepper plants cv Sonar to study the effect of using chicken manure at the rate of 2 m^3 / green house or compost at the of 1,2 and 3 m^3 / green house as well as effective micro organisms (EM) and slow release fertilizers, urea formaldehyde (enciabein) on vegetative growth characters at 75 and 150 days from transplanting, early and total yields, fruit characters as well as T.S.S., ascorbic acid (Vit. C) and nitrate accumulation. Applying 3m^3 of compost / green house led to significantly increased and the highest values of plant height, number of branches and leaves, total leaf area, fresh and dry weight of leaves and stem per plant as well as early and total yield/ m^2, fruit weight and ascorbic acid (Vit. C). However, organic fertilizers non significantly affected on plant height in the second samples of the first season and in the first and second samples in the second season as well as number of branches in the second samples in the second season, fruits weight of early yield, fruits number of total yield in the second season, dry matter percentage, T.S.S and flesh thickness of fruit in both seasons. Application EM significantly affected and caused the highest values of vegetative growth characters, early and total yield as well as fruit quality followed by enciabein in both seasons. The highest total yield of fruit were obtained with application the combined 3m^3 of compost with EM followed by 2 m^3 of compost with EM and increasing by 98% and 73%, respectively in the first season and 67% and 50%, respectively in the second seasons as comparing with applying 2 m^3 chicken manure alone. Inoculation organic fertilizers (chicken manures or compost at different levels) with EM reduced nitrate accumulation in pepper fruits.

INTRODUCTION

Sweet pepper is (*Capsicum annuum L.*) an important vegetable crop grown under protected cultivation in Egypt. More than 30% of the green houses in Egypt are cultivated with sweet pepper for export and local consumption. Pepper fruits contain some important nutritional compounds for human feeding, especially vitamins A and C.

The addition of organic matter improved the physical, chemical and biological properties of soils and in turn improved the ability of plant to absorb nutrients (Sterrett, *et al.,* 1982 and Harrison and Staub, 1986). Organic manure was found to play an important role in increasing growth, yield and its components of many crops. Hsieh and Hsu (1994) mentioned that plant height as well as fruit size and fruit number of pepper were significantly

higher by application of organic manure than those with chemical fertilizer. Ryan *et al.* (1985) found that organic manure gave positive and significant increments for tomato plant height, leaf area and number of fruit per plant. These improvements were much pronounced by application of chicken manure. The same improving effect was found by Mantagu and Goh (1990), Warman (1990) and Giardini *et al.* (1992) on tomato mentioned that chicken manure increased total yield and improved the quality of tomato fruits. El-sheikh and Salama (1997) showed that application of chicken manure at 30 and 45 kg/540m^2 increased the growth of tomato plant (plant height and leaf number), fruit number, early and total yield, fruit components and their properties. The compost made of poultry manure therefore appears to be a promising ecological alternative to classical fertilizers (Ghorbani, *et al.*,2008).

The technology of effective microorganisms (EM) was developed by Dr. Teruo Higa, the professor of the Horticulture Department of University of the Ryukyus, Okinawa, Japan (Higa and Wididana 1991). EM is produced in about 15countries including Japan, China, Brazil, India, U.S and about 50 countries are using or testing EM around the world. EM has also been known by a number of other names around the world: essential microorganisms, beneficial microorganisms, molasses culture, etc. these effective microorganisms consists of nitrogen-fixing, phosphate-dissolving and photosynthetic microorganisms, vesicular-arbuscular mycorrhizas, Bacillus, lactobacillus, yeasts and actinomycetes (Higa and Kinjo, 1991 and Higa and Parr, 1994) which, in combination, were more effective for agricultural purposes, humans, animals and the natural environment.

The technology of effective microorganisms (EM) has multiple applications in agriculture. It was applied to plants through the irrigation water (Higa and Kinjo, 1991) to enhance productivity of organic or nature-farming systems directly, to compost, which reduced the time required for the preparation of this biofertilizer or as foliar application on plants (Yadav, 2000). Effective microorganisms have been shown to improve growth, yield and quality of crops over a wide range of agro-ecological conditions (Higa and Wididana, 1991 and Higa and Parr, 1994). Effective microorganisms is particularly effective in promoting plant growth and production under the stress conditions such as drought, heat, insect, diseases and when the greatest loss in crop yield and quality can occur (Higa and Parr, 1994). Daly and Stewart (1999) and Sangakkara and Higa (2000) found that the use of EM increased yields of vegetables over a long period of time.

Also, it has a beneficial role on accelerating the mineralization processes of organic and helps nutrient release under temperate conditions and this enhance utility values of organic matter (Yadav, 1999 and Sangakkara and Weerasekera, 2001). Effective microorganisms (EM) also enhanced protein activity (Konoplya and Higa, 2001) and photosynthesis. (Xu, *et al.*, 2000 and, Zarb, *et al.*, (2001) reported that the interaction between microbes and plants could enhance the productivity of most farming systems significantly.

The certain microorganisms in EM culture such as photosynthetic and N-fixing bacteria can enhance the plants photosynthetic rate, efficiency and N-fixing capacity (Zarb, *et al.*, 2001).

Slow release fertilizers is evident from several new products marketed in recent years. The potential benefits claimed are increasing plant use efficiency by prolonged soil reduction and fewer fertilizer application, thus saving fertilizer and application costs (El-Aila and Abou Seed 1996). Also, urea formaldehyde is considered one of the worlds leading nitrogen fertilizer due to its high nitrogen content 40%, low cost and commercial. It has however, the major limitation of easy dissolution in water and rapid hydrolysis. These conditions cause high nitrogen losses through ammonia volatilization.

Allen (1984) showed that single application of slow release N fertilizer gave maximum yield production of plants. Also, Awad, *et al.* (1987) stated that urea formaldehyde increased dry matter and nitrogen content of tomato plants. However, Aziz and El-Ashry (2002) on pepper showed that coating ammonium nitrate and urea with elemental sulphur significantly increase plant height, fresh and dry weight as compared with both uncoated fertilizers.

Also, Mahmoud, *et al.*(1992) on tomato grown in the winter season with high levels of nitrogen from 60 to 75 kg/fed. as urea and urea formaldehyde (UF) in sandy soil found fresh and dry weight as well as uptake of tomato plants were not greatly affected. Application of organic manure (chicken manure at high rate) combined with biofertilizer and mineral N on pepper resulted in increased fruit length, diameter and flesh thickness. In addition, it recorded the best values for vitamin C content, total soluble solids percentage, dry matter. Application of organic, mineral or biofertilizer alone had a little effect compared with mixed application of 2 of them or combined application of all of them (Ghoname and Shafeek 2005).

Accumulation of nitrate in fruits has many detrimental effects on human health. Nitrite may be accumulated from nitrate after ingestion, causing methaemoglobinema (Wright and Davison, 1964). Fruits harvested from application organic and/or bio-fertilizers had lower nitrate, ammonium and total N contents, but higher K, Fe and Zn contents than those from untreated plants (Kostov, *et al.*,1996 and Siminis, *et al.*,1998).

The main objective of this investigation was to evaluate the impact of using chicken manure, compost, EM and enciabein applications on growth, yield and its components as well as fruit quality of sweet pepper under greenhouse condition.

MATERIALS AND METHODS

The Experiment was conducted at Kaha Experimental Farm ,Qalubia Governorate in two successive seasons 2006-2007 and 2007-2008. Seeds of sweet pepper cv. Sonar F1 hybrid (Takii co.,Japan) were sown in the nursery on 17th and 15th of July in both seasons, respectively in trays (84cells) filled with 1:1 by volume ,petmoss and vermiculite media. Seedlings were transplanted on 7th and 2nd of September in both seasons in the green house. The plastic cover was local UV –treated polyethylene sheet of 7.5m in width and 200 microns in thickness. Such plastic house was equipped with agro-drip irrigation system.

The physical and chemical properties of the soil under study were presented as average in both seasons in Tables (1-2)
The chemical properties of soil were determined using the methods described by Jackson (1962).

Table (1): Physical characteristic of experimental soil

Organic matter	Coarse sand %	Fine sand %	Fine sand %	Clay %	Texture
1.5%	7.43	16.77	34.88	40.92	Clay loam

Table (2): Chemical characteristic of experimental soil

EC ds/m	pH	HCO_3 meq/l	CO_3 meq/l	SO_4 meq/l	Ca meq/l	MN meq/l	Mg Meq/l	Cl Meq/l	Na meq/l	K meq/l	P_2O_5 ppm	N ppm
1.01	7.8	1.6	0	0.67	1.38	1.7	0.7	1.42	2.11	0.31	20.1	82.5

The experimental included 12 treatments which were the combinations of organic manure, i.e. the chicken manure at the rate 2 m^3/540 m^2 and compost treatments (at the rate of 1, 2 and 3 m^3/540 m^2) with soil supplements, i. e. urea formaldehyde(40%N) (enciabein), effective microorganisms (EM) or without soil addition.These effective microorganisms consists of nitrogen-fixing, phosphate-dissolving and photosynthetic microorganisms, vesicular-arbuscular mycorrhizas, Bacillus, lactobacillus, yeasts and actinomycetes The Chemical analysis of used chicken manure and compost were presented in Table (3) as average in both seasons.

Table (3): Chemical analysis of organic sources used at experimental period.

Organic sources	N %	P %	K %	Fe ppm	Zn ppm	Mn ppm	Cu ppm	PH	C/N ratio	Organic c%
Chicken manure	3.21	0.73	1.15	58.73	67.30	12.8	25.0	7.5	19.81	63.60
compost	2.04	0.94	0.80	20.20	30.5	17.0	11.0	8.08	19.46	30.70

The compost, chicken manure and enciabien were added during soil preparation. EM was added at two split doses, the first dose were applied at the rate of 2 litre /540m^2 before planting and the second dose were added at the rate of 1 litre /540m^2 every two weeks after thirty day from transplanting. Ensiabien were applied at the rate of 40kg/540m^2 .The basal chemical fertilizers were applied before planting as follows: 50 kg calcium super phosphate (15.5%P_2O_5), 25kg potassium sulphat (48% K_2O), 25 kg ammonium sulphate and (20.5% N)15 kg sulphur. The chemical fertilization were followed according the recommendation of ministry of agricultural 100 kg ammonium nitrate (33 % N) +70 litre phosphoric acid (55 % P_2O_5) + 200 kg potassium sulphat (48% K_2O)/540m^2 were applied via drip irrigation divided and fertigated weekly after planting. Other agricultural practices were done according to the recommendation of ministry of agricultural.

The plot dimensions were 6m long, 1m wide and the area 6m^2.Seedlings were planted 50 cm apart on the two sides of each bed. Thus, 1200 plants

were grown per each plastic house (area of 540 m^2). Each square meter contained 2.2 plants.

Experimental design:

The experiment was conducted in three replicates in split plot design, where organic sources presented as the main plots and soil supplements treatments were presented as the sub plot.

Data were recorded on the following characters:

Vegetative growth characters:

Four plants taken from each plot were chosen randomly 75 and 150 days after planting for measuring the following characteristics: plant height, fresh and dry weights of stem and leaves as well as number of leaves, number of branches and total leaf per plant, which measured by using leaf area meter Li-3000.

Early yield were determined for three first picking. Total yield and its component: average fresh weight of fruit per plant were determined and calculated as Kg/m^2.

Mineral nutrients:

Samples of leaves were taken at 50 days after transplanting when the plants were flowering. Determination of N, P and K were carried out on the ground dry materials of plants which were digested using sulfuric acid, salicylic acid and hydrogen peroxide according to Linder (1944). Nitrogen was determined using the micro-kejeldahl apparotus of Parnos–Wagner as described by Van-Schouwenburg and Walinga (1978). Phosphorus was estimated colorometically by using chlorostannous reduced molybdophosphoric blue color method according to Chapman and Parker (1961). Potassium was determined using the flame photometer.

Fruit quality

a-Physical properties

1-fruit length and diameter were estimated by venire caliper in cm

2-flesh thickness was measured by venire caliper in mm.

3-average weight of fruit ,g .

b-Chemical properties:

1-Ascorbic acid (vitamin C) was estimated in mg /100g fruit fresh weight

2- Total soluble solids (T.S.S) percentages determined by using refractometer according to A. O. A. C. (1980)

3-Nitrate accumulation in fruits was determined in distilled water extracts of dried tissue by the procedure of Cataldo *et al.*, (1975) by using salicylic acid and then calculated as mg/100 gram fresh weight.

Statistical analysis:

All data were subjected to the statistical analysis and means were compared according to the LSD test described by Snedecor and Cochran (1980).

RESULT AND DISCUSSION

Vegetative growth :

Data presented in the Tables (4-7) showed that the effect of chicken manure and compost levels on vegetative growth characters, i.e., Number of

leaves, fresh and dry weights of leaves and stems as well as total leaf area per plant were significant in both season in two samples at 75 and 150 days after planting. However, organic fertilizers non significantly affected on plant height in the second samples of the first season and in the first and second samples in the second season as well as number of branches in the second sample in the second season.

It was clear that increasing the levels of compost increased the values of vegetative growth parameters. The highest values were obtained with application $3m^3$ of compost/540 m^2 while $1m^3$ compost caused the lowest values in both seasons. It was observed that, no significant differences between the values of most the studied vegetative growth characters recorded by plant fertilized with $2m^3$ chicken manure or $2m^3$ of compost / green house in two samples in both seasons.

These results are in agreement with those Hsieh and Hsu (1994) on pepper , El-sheikh and salama (1997) on tomato mentioned that adding chicken manure enhanced the plant growth. Salama and Zake. (2000) found that plant growth parameters such as plant height, number of leaves and dry matter content were increased by using pigeon manure at a rate of 45 kg/540 m^2 alone or mixed with chicken manure at a rate of 22.5 kg/540 m^2 during irrigation. Youssef, *et al.* (2001) mentioned that treatment with 100% organic manure (chicken manure) alone or in combination with ammonium nitrate resulted in taller plants than other treatments. Peyvast, *et al.* (2007)reported that increasing the municipal solid waste compost (MSWC) to 150 t.ha-1, plant length, branch and flower numbers, plant total fresh and dry weight of green pepper can increase significantly.

On the other hand, data in Tables (4-7) revealed the effects of supplements effective microorganisms (EM) or urea formaldehyde (Enciabein) on vegetative growth characters were significant in both samples in both seasons. Pepper plants supplied with EM gave the highest values of vegetative growth parameters followed by enciabien(En) compared to non-supplement.

As regard to the effects the interaction between organic fertilizers and the supplements, (EM or ensiabein) were significant on all of the studied growth characters in two growth samples for both seasons.

Data presented in Tables (4-7) indicated that the highest values of all vegetative growth character were obtained when application $3m^3$ compost combined with effective microorganisms (EM) followed by the combined of $2m^3$ chicken manure and EM or the combined of $2m^3$ compost and EM, without significant differences, in the two samples in the both seasons. However, pepper plants fertilized by $1m^3$ compost /green house alone had the lowest values of vegetative growth characters of the two samples in both seasons. It was observed that supplement of EM to $1m^3$ compost significantly increased the values of most vegetative growth compared to fertilization by $2m^3$ chicken alone in the two samples in both seasons.

Application of compost with EM at the rate of 1 m^3, 2 m^3 and 3 m^3 gave the higher values of the vegetative growth parameters, i.e. plant height, number of leaves, number of branches and total leaf area as well as fresh and dry weight of leaves and stem per plant compared with 2 m^3 of chicken

manure. The lower values were observed with application of $2m^3$ of chicken manure alone. The results showed the same trend during both seasons.

Table (4): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on plant height, No. of branches, No. of leaves and total leaves area/plant of sweet pepper grown in season 2006- 2007

Organic fertilizers	Supplements	75 days after transplant				150 days after transplant			
		Plant height (cm)	No. of branches /plant	No. of leaves plant	Total leafarea cm^2/plan	Plant height (cm)	No. of branches / plant	No. of leaves / plant	Total lea area cm^2/plan
Chicken 2m		68.2	21.0	135.2	5207	77.4	23.3	232.1	12340
Compost $1m^3$		59.6	16.1	119.6	3311	75.3	21.9	196.1	7379
Compost $2m^3$		66.6	19.1	145.9	5118	77.9	22.8	212.2	11100
Compost $3m^3$		71.9	21.4	167.0	7452	79.8	24.6	279.1	16850
LSD		3.52	1.72	6.94	2643	NS	1.54	9.34	4658
	Without	54.5	16.6	94.7	1924	73.5	20.8	168.8	4821
	EM	76.9	23.0	191.6	9685	82.3	25.7	283.7	20810
	En	68.2	18.6	139.5	4207	77.0	23.1	237.1	10120
	LSD	3.18	2.15	7.38	1482	6.28	2.13	16.02	4094
Chicken 2m	Without	57.8	19.9	100.7	2162	75.3	21.4	172.3	5138
	EM	78.9	24.6	175.3	9994	80.2	25.3	285.3	22880
	En	67.9	18.8	129.7	3466	76.8	23.2	238.6	8996
Compost $1m^3$	Without	45.2	11.3	72.3	1123	69.8	21.8	134.9	2920
	EM	70.2	19.8	169.3	6023	79.6	21.7	248.5	12390
	En	63.3	17.2	117.1	2786	76.5	22.4	204.9	6830
Compost $2m^3$	Without	55.1	17.2	95.4	1867	73.5	18.5	153.1	4203
	EM	75.5	22.1	191.7	9790	83.0	27.0	268.3	21670
	En	69.2	17.9	150.6	3698	77.2	23.0	215.1	7427
Compost $3m^3$	Without	60.0	18.1	110.3	2545	75.4	21.5	214.8	7025
	EM	83.1	25.6	230.0	12930	86.5	28.7	332.6	26290
	En	72.4	20.7	160.6	6879	77.5	23.7	289.9	17240
LSD		6.36	4.30	14.75	2964	12.55	4.25	32.03	8189

These results agreed with those of Higa and Wididana (1991), Higa and Parr (1994) and Wididana and Higa (1995) who found that EM improved the plant growth characters. This effect might be due to that EM increased the microorganisms in the soil, which convert the ability of mobilizing the unavailable forms of nutrient elements to available forms. Moreover, the microorganisms produce growth-promoting substances, which increase the plant growth characters and increased the chlorophyll and nutrient contents by plant. It could be concluded that the causal phenomenon of these results has been attributed also to many factors as reported by Higa and Wididana (1991) on suppression of plant pathogens and diseases, enhanced nutrient availability and stimulated plant growth i.e., auxin-mediated effects; Yadav (1999) and Sangakkara and Weerasekera (2001) on releasing of nutrients from organic matter; Kohoplya and Higa (2001) on enhanced protein activity and Xu, *et al.* (2001) on enhanced photosynthesis activity which increased the plant growth characters. Gharib (2001) on cucumber mentioned that using biofertilizer led to a remarkable promotion effect on the growth, i.e. stem length number of branches, number of leaves and leaf area. Ghoname and Shafeek.(2005) on pepper reported that application of organic manure

(chicken manure at high rate) combined with biofertilizer and mineral N resulted in vigorous plants, expressed as plant length, number of leaves and stems as well as shoot dry weight, in both seasons. Application of organic, mineral, or biofertilizer alone had a little effect compared with mixed application of 2 of them or combined application of all of them.

Table(5): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on plant height, No. of branches, No. of leaves and total leaves area/plant of sweet pepper for seasons 2007-2008.

Organic fertilizers	Supplements	75 days after transplant				150 days after transplant			
		Plant height (cm)	No. of branches/plant	No. of leaves / plant	Total leaf area cm^2/plant	Plant height (cm)	No. of branches / plant	No. of leaves /plant	Total leaf area cm^2/plant
Chicken 2m		60.6	12.3	144.5	4885	88.7	20.8	195.3	9230
Compost $1m^3$		55.9	11.1	128.0	3876	87.0	18.6	172.2	7330
Compost $2m^3$		59.9	12.4	159.0	6238	90.2	21.3	203.0	10880
Compost $3m^3$		63.7	13.5	189.5	8687	94.2	22.7	236.6	17280
LSD		NS	0.22	12.96	743.4	NS	NS	10.64	3503
	Without	52.6	9.17	103.1	2125	82.6	16.2	141.1	4088
	EM	65.9	15.7	213.6	11270	98.5	25.7	267.6	19620
	En	61.7	12.2	149.1	4370	88.9	20.7	196.5	9832
	LSD	4.84	0.20	10.60	640.1	2.66	1.15	11.20	3437
Chicken 2m	Without	55.1	9.8	108.6	2408	83.2	17.5	150.8	4682
	EM	65.5	15.3	180.0	8665	95.5	24.8	241.8	16300
	En	61.3	11.7	144.8	3582	87.3	20.1	193.2	6706
Compost $1m^3$	Without	43.5	7.5	81.1	1202	80.1	13.0	110.9	2378
	EM	63.5	14.3	169.7	7257	94.4	23.4	229.6	13760
	En	60.8	11.5	133.3	3168	86.6	19.4	176.0	5854
Compost $2m^3$	Without	51.8	8.7	99.4	2040	82.0	15.9	137.3	3934
	EM	66.7	16.2	223.9	12140	99.3	26.6	267.7	20320
	En	61.3	12.4	153.9	4532	89.3	21.3	203.9	8405
Compost $3m^3$	Without	60.2	10.6	123.2	2851	85.3	18.5	165.3	5357
	EM	67.8	16.9	281.0	17010	105.0	27.8	331.4	28110
	En	63.2	13.2	164.3	6196	92.2	21.9	213.0	18360
	LSD	9.68	0.41	21.20	1280	5.31	2.30	22.39	6874

As regard to the effect of enciabein(En), it improved plant growth and increased significantly vegetative growth characters in both seasons. 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 (Yagodin,1984). The data are in harmony with Awad, *et al.* (1987) on tomato plant and Aziz and El-Ashry (2002) on pepper plant found that coating ammonim nitrate and urea with elemental sulphur significantly increased plant height, fresh and dry weight as compared with both uncoated fertilizers.

Yield and its components:

1 - Early and total yield:

The present results in Table (8) showed that the effect of chicken manure and compost levels on fruit number and weight of early and total yield/m^2 were significant in both seasons, except weight of fruits for early yield and number of fruit for total yield/m^2 in the second season. Increasing the levels of compost increased fruit number and fruits weight/m^2 for early and total yield. The highest values were obtained by applying $3m^3$ of compost/greenhouse ($540m^2$) while the lowest values were obtained by applying $1m^3$. It was observed that no significant differences between applying $2m^3$ of chicken manure and $2m^3$of compost/green house as effect on fruit number and weights/m^2 for early and total yield in both seasons, expect fruit weight / m^2 for total yield in the first season.

These results are in agreement with that of El-Sheikh and Salama (1997) mentioned that chicken manure increased tomato early and total yield. Salama and Zake (2000) on pepper reported that early yield and total yield were increased by using pigeon manure at a rate of 45 kg/540 m^2 alone or mixed with chicken manure at a rate of 22.5 kg/540 m^2 during irrigation. The increase in total yield due to such treatments was 23% over the control treatments. Youssef, *et al.* (2001) on tomto found that organic manure (25%) + a mineral fertilizer (75%) was the best treatment for producing early and total yields. Ghoname and Shafeek (2005) on pepper mentioned that application of organic manure (chicken manure at high rate) combined with biofertilizer and mineral N resulted in increasing number of fruits, average fruit weight and total fruit yield per plant. Arafa and Shalabey (2007) on pepper reported that organic manures at different levels (5 and 10 ton/fed) as biogas compost and compost gave significantly increase in the fresh and dry weight of fruits per plant and per feddan as compared with the control treatment, with significant differences between the organic manures levels. Ramadan, *et al.* (2007) on tomato mentioned that the highest fruit yield was found by 75% poultry manure plus 25% mineral fertilizer. Biofertilizer increased significantly the total yield of tomato fruits. Lee and Liao (2007) on pepper and Ghorbani, *et al.* (2008) on tomato reported that the compost made of poultry manure therefore appears to be a promising ecological alternative to classical fertilizers.

Concerning the effect of the supplements of effective microorganisms (EM) or urea formaldehyde (enciabein) "En" on fruit number and fruit weight/ m^2 for early and total yield were significant in both seasons (Table 8). Addition of EM caused the highest values of early and total yield followed by ensiabein (En) as comparing with non-addition treatment in both seasons.

The effects of the interaction between organic fertilizers and the applications of the supplements on early and total yield were significant in both seasons. Data presented in Table (8) indicated that the highest values of fruit number and weight for early and total yield/m^2 were obtained by application the combined of $3m^3$ compost and addition EM to the soil followed by $2m^3$ of compost with addition EM. The highest total yield of fruit were obtained with application the combined $3m^3$ of compost with EM followed by 2 m^3 of compost with EM by increasing 98% and 73%, respectively in the first season

and 67% and 50%, respectively in the second seasons as comparing with applying 2 m^3 chicken manure alone.

Table (6): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on fresh and dry weight of leaves and stem per plant of sweet pepper grown in season (2006- 2007).

Organic fertilizers	Supplements	75 days after transplant				150 days after transplant			
		Leaves fresh weight /plant (g)	Leaves dry weight / plant (g)	Stem fresh weight / plant (g)	Stem dry weight /plant (g)	Leaves fresh weight /plant (g)	Leaves dry weight / plant (g	Stem fresh weight / plant (g)	Stem dry weight /plant (g)
Chicken 2m		42.8	8.7	148.5	25.9	142.7	28.5	227.3	41.6
Compost 1m^3		46.5	8.8	131.7	23.5	115.9	23.2	217.0	39.7
Compost 2m^3		51.1	10.6	138.2	24.6	134.0	26.8	229.0	41.2
Compost 3m^3		80.2	13.1	165.3	29.4	152.0	30.4	259.3	46.6
LSD		21.15	2.024	16.02	4.33	12.30	5.86	21.15	5.42
	Without	194.3	5.8	105.6	18.8	91.19	18.2	194.3	34.9
	EM	271.4	16.4	184.2	32.8	175.1	34.9	271.4	49.8
	En	233.8	8.8	148.0	25.9	142.2	28.4	233.8	42.1
	LSD	12.90	1.80	10.82	3.90	13.15	4.02	12.90	2.97
Chicken2m^3	Without	198.5	5.2	105.7	19.0	95.2	19.0	198.5	35.8
	EM	253.9	13.0	187.8	33.4	189.6	37.9	253.9	47.6
	En	229.5	7.9	152.0	25.4	143.2	28.6	229.5	41.4
Compost 1m^3	Without	176.2	5.9	102.6	18.3	70.5	14.1	176.2	31.6
	EM	245.7	12.7	161.5	28.8	148.0	29.6	245.7	46.1
	En	229.1	7.7	131.1	23.4	129.3	25.9	229.1	41.3
Compost 2m^3	Without	184.8	5.1	94.7	16.8	87.9	17.6	184.8	33.2
	EM	269.0	16.9	179.5	32.0	175.6	34.5	269.0	48.4
	En	233.2	9.7	140.4	25.0	138.5	27.7	233.2	41.9
Compost 3m^3	Without	217.6	6.8	119.3	21.2	111.2	22.2	217.6	39.1
	Em	317.2	22.8	208.1	37.1	187.3	37.5	317.2	57.1
	En	243.2	9.9	168.6	30.0	157.6	31.5	243.2	43.6
	LSD	25.80	3.60	21.63	7.79	26.29	8.04	25.80	5.93

The lowest values of fruit number and fruit weight for early and total yield were obtained when fertilized pepper plants with 1m^3 compost alone compared with 2m^3 of chicken manure alone.

These results due to the effect of effective microorganisms (EM) on enhancing plant growth characters which in turn improved the yield. These result agreed with those of Higa and Wididana, (1991), Higa and Parr (1994), Daly and Stewart (1999), Sangakkara and Marambe (1999); Sanagakkara and Higa (2000) and Yadav (2000) who found that the use of EM increased the yields of vegetables crops. Sangakkara (2001)working on tomato found that the yields of the crops grown in the 3 types of organic matter and EM increased over time, and were higher than those of crops grow under conventional conditions.

Moreover, it could be concluded that the causal phenomenon of these results has been attributed also to the interaction between microbes and plants, which enhanced the plant productivity as, reported by Zarb *et al.* (2001).

As regard to the effect of enciabein, it increased significantly early and total yield in both seasons. The effect of enciabein might be due to the increase of the nutrients element in the soil. This increase can encourage the growth, which increase the photosynthetic rates. Similar results have been found by Allen (1984) and Mahmoud, *et al.*(1992) on tomato.

Table (7): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on fresh and dry weight of leaves and stem per plant of sweet pepper grown in season 2007-2008.

Organic manure	Suppl-ements	75 days after transplant				150 days after transplant			
		Leaves fresh weight /plant (g)	Leaves dry weight plant (g)	Stem fresh weight / plant (g)	Stem dry weight /plant (g)	Leaves fresh weigh /plant (g)	Leaves dry weight / Plant (g)	Stem fresh weight / plant (g)	Stem dry weight /plant (g)
Chicken 2m		52.2	10.4	124.9	22.2	124.7	24.9	238.4	42.4
Compost 1m^3		43.5	8.7	101.7	18.1	104.4	20.9	214.7	38.2
Compost 2m^3		57.4	12.1	130.7	23.3	129.2	25.8	254.5	45.3
Compost 3m^3		76.1	15.2	159.0	28.3	152.4	30.5	297.7	53.0
LSD		13.28	2.58	3.00	0.52	11.53	2.28	25.36	4.55
	Without	30.6	6.6	75.6	13.44	77.4	15.5	173.5	30.9
	EM	92.7	18.6	186.1	33.13	181.9	36.4	342.1	60.9
	En	48.6	9.7	125.6	22.36	123.8	24.7	238.3	42.4
	LSD	6.65	1.53	4.83	0.86	10.15	2.03	12.16	2.15
Chicken 2m	Without	33.6	6.7	86.0	15.3	86.4	17.3	183.1	32.6
	EM	78.0	15.1	168.3	30.0	167.4	33.5	307.7	54.8
	En	44.9	9.0	120.5	21.4	120.4	24.1	224.5	39.9
Compost 1m^3	Without	22.6	4.5	48.4	8.6	55.7	11.1	142.9	25.4
	EM	65.8	13.1	151.1	26.9	155.3	31.0	282.6	50.3
	En	42.1	8.4	105.7	18.8	102.3	20.4	218.5	38.9
Compost 2m^3	Without	27.0	7.2	70.7	12.6	75.7	15.1	167.6	29.8
	EM	94.0	18.8	188.1	33.5	180.4	36.1	347.5	61.8
	En	51.2	10.2	133.5	23.8	131.5	26.3	248.3	44.2
Compost 3m^3	Without	39.1	7.8	97.3	17.3	91.64	18.3	200.4	35.7
	EM	133.2	26.6	236.9	42.2	224.7	44.9	430.8	76.7
	En	56.14	11.2	142.7	25.4	141.0	28.2	261.9	46.6
	LSD	13.30	3.06	9.66	1.73	20.31	4.05	24.33	4.30

2-Quality of fruits:

Concerning the effect of source and levels of organic fertilizers, data presented in Tables (9and10) indicated that significant differences were obtained on fruit length, diameter and weight as well as ascorbic acid concentration of fruit in both seasons; expect fruit length in the second season. On the other hand, the effects of sources and levels of organic fertilizers on flesh thickness, total soluble solids (T.S.S) and dry matter percentage of fruit were not significant in both seasons. Increasing the levels of compost increased the values of fruit characters. The highest values of fruit characters were obtained by fertilized 3m^3 of compost while the lowest values were obtained by applying 1m^3 of compost / green house in both seasons.

These results were in agreement with those of El-Sheikh and Salama (1997)reported that chicken manure at either or both rates increased tomato fruit components and fruit properties (weight, flesh thickness, firmness, total

soluble solids content and ascorbic acid content). Salama and Zake (2000)reported that there are no significant between all treatments (pigeon manure at a rate of 45 kg/540 m2 alone or mixed with chicken manure at a rate of 22.5 kg/540 m2) on ascorbic acid and total soluble solids. Youssef, *et al.* (2001) on tomato mentioned that fruit dimensions were highest with organic manure alone. Organic manure (25%) + mineral fertilizers (75%) was the best treatment for producing early and total yields as well as fruit total soluble solids while organic manure (75%) + mineral fertilizers (25%) gave heavier fruit weight, bigger fruit length, fruit diameter and fruit flesh thickness than the control. Ghoname and Shafeek(2005) on pepper found that application of organic manure (chicken manure at high rate) combined with biofertilizer and mineral N resulted in increased fruit length, diameter and flesh thickness. In addition, it recorded the best values for vitamin C content, total soluble solids percentage and dry matter. Application of organic, mineral or biofertilizer alone had a little effect compared with mixed application of 2 of them or combined application of all of them. Peyvast, *et al.* (2007) mentioned that increasing the municipal solid waste compost (MSWC) to 150t./ha, vitamin C content of green pepper can increase significantly. Higher levels of MSWC (150 and 200 t./ ha) didn't show any significant differences.

The effects of supplements (EM or Enciabein) on fruit length, diameter and weight as well as flesh thickness, T.S.S, dry matter percentage and ascorbic acid (Vit.C) were significant in both seasons. Pepper plants supplied with EM followed by enciabein (En) had the highest values of fruit characters compared with untreated plants.

The interaction between organic fertilizers and soil supplements on fruit characters were significant in both seasons. Pepper plants received the combined of compost at the rate $3m^3$ and EM gave the highest values of fruit characters followed the combined of compost at the rate of $2m^3$ and EM compared with $2m^3$ of chicken manure alone. Addition $1m^3$ of compost alone led to decrease the values of fruit characters expect flesh thickness which had the lowest values by adding $2m^3$ chicken manure or $2m^3$ of compost in first and second, respectively. Whereas the lowest values of T.S.S were obtained by applying $2m^3$ of compost in the second season.

These results were in agreement with those of Xu, *et al.* (2000) on tomato reported that EM inoculation of both bokashi and poultry manure increased photosynthesis and fruit yield. Concentrations of sugars and organic acids were higher in fruits of plants given bokashi than in fruits in other treatments. Vitamin C concentration was higher in fruits from poultry manure and bokashi plots than in those from chemical fertilizer plots. EM inoculation increased vitamin C concentration in fruits from all fertilizer treatments.

Table (8): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on early and total yield in seasons of 2006-2007 and 2007-2008.

Organic manure	Supplements	2006- 20007				2007- 2008			
		Early yield No/m^2	Early yield weight Kg/m^2	Total yield No/m^2	Total yield weight kg /m^2	Early yield No/m^2	Early yield weight kg /m^2	Total yield No/m^2	Total yield weight kg /m^2
Chicken 2m^3		50.4	4.3	136.9	11.6	26.5	2.5	109.3	10.0
Compost 1m^3		41.8	3.7	115.1	9.9	23.7	2.5	97.6	9.5
Compost 2m^3		49.2	4.1	132.6	11.2	28.0	2.7	105.3	10.2
Compost 3m^3		57.4	4.8	154.8	13.0	32.0	3.0	107.3	11.2
LSD		4.79	0.33	5.39	0.37	2.24	N.S	N.S.	0.98
	Without	36.8	3.1	101.5	8.5	18.1	1.9	84.3	8.5
	EM	65.5	5.4	174.2	14.7	39.2	3.8	124.5	12.4
	En	46.9	4.0	128.9	11.1	25.4	2.4	102.0	9.8
	LSD	2.15	0.21	2.56	0.25	1.78	0.35	9.36	0.53
Chicken 2m^3	Without	35.7	3.1	101.6	8.6	19.0	1.8	89.8	8.5
	EM	68.8	5.9	179.5	15.2	36.7	3.5	119.3	11.5
	En	46.9	3.9	129.6	11.0	23.8	2.3	103.8	9.9
Compost1m^3	Without	35.3	3.1	94.2	8.1	16.3	2.3	78.1	8.3
	EM	50.8	4.3	141.2	12.0	33.0	3.2	119.5	11.1
	En	39.3	3.6	109.9	9.6	21.7	2.1	95.1	9.1
Compost 2m^3	Without	36.3	3.0	98.9	8.4	16.8	1.6	78.8	7.6
	EM	66.9	5.4	176.3	14.8	40.6	4.1	131.7	12.8
	En	44.4	3.7	122.6	10.4	26.7	2.5	105.3	10.1
Compost 3m^3	Without	39.7	3.2	111.2	8.9	20.3	1.9	90.4	9.6
	EM	75.5	6.2	199.7	16.9	46.4	4.5	148.3	14.2
	En	57.0	5.0	153.5	13.2	29.4	2.7	103.9	9.9
	LSD	4.30	0.43	5.12	0.50	3.55	0.71	18.72	1.07

It is concluded that both fruit quality and yield could be significantly increased by EM inoculation of the organic fertilizers and application directly to the soil.

Nitrate accumulation:

The results in Table (9 and10) indicated nitrate accumulation in fruit of pepper plants significantly affected with the application of organic fertilizers in both seasons. The highest values of nitrate were recorded by plants fertilized with 3m^3 of compost in both seasons.

Regarding to the effect of the supplements (EM or EN) on nitrate accumulation in fruit was significant in both seasons. The highest values of nitrate were obtained with applying enciabein (En) in both seasons. Concerning the interaction between organic fertilizers and the supplements (EM or En) ,data presented in Table (11) indicated that the values of nitrate significantly affected by the interaction in both seasons. The highest values of nitrate were obtained by the combined of 3m^3 of compost with enciabein in both seasons. The lowest values of nitrate were recorded by plants fertilized by 1m^3 of compost alone in both seasons. From these results it was observed that EM reduced nitrate accumulation in fruits of pepper plants.

Table(9): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on fruit characteristics of sweet pepper grown in seasons 2006- 2007.

Organic fertilizers	Supplements	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Flesh thickness (mm)	Dry matter %	Vit C mg/100 g f.w	T.S.S.	Nitrate mg/100g f.w
Chicken2 m³		10.1	7.7	113.8	4.9	8.5	154.6	4.8	54.8
Compost 1m		8.5	7.3	105.0	4.6	8.3	151.5	4.4	47.1
Compost 2m		9.5	7.4	110.0	4.7	8.4	155.5	4.4	60.1
Compost 3m		11.3	8.0	118.8	5.5	8.6	158.5	4.9	68.6
LSD		0.58	0.47	1.35	NS	NS	4.30	NS	5.01
	Without	7.2	6.4	96.9	3.9	8.1	145.0	3.7	55.7
	EM	12.5	8.5	125.9	5.8	8.8	165.1	5.5	58.2
	En	9.8	7.8	112.8	5.0	8.5	155.0	4.7	59.2
	L.S.D.	0.87	1.07	1.01	0.57	0.26	2.41	0.24	0.5
Chicken 2m³	Without	7.5	6.7	98.8	3.7	8.1	146.7	4.0	53.4
	EM	12.9	8.8	128.8	5.8	8.9	163.5	5.6	55.1
	En	9.9	7.6	113.8	5.1	8.5	153.4	4.8	55.8
Compost 1m	Without	6.4	6.0	91.3	3.8	7.9	141.4	3.6	42.8
	EM	10.8	7.5	117.5	5.4	8.6	161.5	5.1	49.0
	En	8.3	8.1	106.3	4.5	8.3	151.5	4.5	49.4
Compost 2m	Without	7.4	6.0	95.0	3.8	8.0	143.3	3.6	58.8
	EM	11.8	8.6	125.0	5.5	8.8	166.6	5.2	60.3
	En	9.2	7.6	110.0	4.9	8.4	156.5	4.5	61.4
Compost 3m	Without	7.6	6.8	102.5	4.4	8.2	148.4	3.4	67.8
	EM	14.4	9.18	132.5	6.4	9.0	168.6	6.2	68.4
	En	11.8	7.9	121.3	5.6	8.7	158.5	5.1	70.0
	L.S.D.	1.44	2.14	2.02	1.44	0.53	6.10	0.49	4.13

Table(10): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on fruit characteristics of sweet pepper grown in seasons 2007-2008

Organic manure	Supplements	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Flesh Thickness (mm)	Dry matter %	Vit. C mg/100 (g) F.W.	T.S.S.	Nitrate mg/100 (g) F.W.
Chicken2m³		10.1	9.2	111.8	5.0	8.2	153.4	4.9	57.6
Compost 1m		9.0	8.6	107.4	5.1	8.1	149.8	5.0	52.9
Compost 2m		10.3	9.2	112.1	4.8	8.3	154.5	4.9	62.0
Compost 3m		11.4	10.1	114.3	5.3	8.4	158.3	5.2	65.5
LSD		N.S	0.73	2.89	N.S	NS	4.1	N.S	3.21
	Without	7.6	7.2	104.5	4.5	7.9	143.1	4.5	57.7
	EM	13.1	11.1	117.4	5.8	8.7	165.2	5.6	59.2
	En	9.9	9.4	112.3	4.9	8.3	153.7	4.9	61.7
	LSD	0.80	0.43	4.09	0.31	0.42	6.51	0.25	0.42
Chicken 2m³	Without	8.0	7.5	105.9	5.0	7.9	144.4	4.8	56.6
	EM	12.7	11.2	116.8	5.6	8.6	163.6	5.5	57.7
	En	9.5	8.8	112.6	4.6	8.2	152.2	4.5	58.4
Compost 1m	Without	6.7	6.6	98.5	4.2	7.7	138.8	4.4	50.4
	EM	11.6	10.8	114.2	5.8	8.5	161.0	5.6	51.4
	En	8.6	8.3	109.4	5.2	8.1	149.6	5.1	57.0
ompost 2m³	Without	7.5	6.8	104.8	4.1	7.8	141.7	4.1	60.2
	EM	13.3	11.2	118.7	5.6	8.7	166.8	5.8	61.8
	En	10.2	9.7	112.8	4.6	8.3	154.9	4.6	64.0
Compost 3m	Without	8.2	8.1	108.8	4.6	8	147.3	4.7	63.4
	EM	14.9	11.3	119.8	6.1	8.8	169.4	5.6	65.7
	En	11.2	10.7	114.2	5.3	8.4	158.1	5.3	67.4
	LSD	1.59	0.85	8.19	0.62	0.85	9.30	0.50	3.31

These results were in agreement with those of Kostov, *et al.* (1996) on tomato reported that inoculation of the vine branch compost with a *Cephalosporium* sp lowered nitrate contents in all composts. It appeared that

when nitrate-N concentration in the composts were >5% of the total N- NO3 accumulation in the fruits could result.

Plant chemical constituents :

The results in Table (11) indicated that concentration of N, P and K in leaves of pepper plants significantly affected with the application of organic fertilizers in both seasons. The highest values of N percentage were recorded by plants fertilized with $2m^3$ of chicken manure or $3m^3$ of compost in the first and second seasons, respectively. On the other hand, the highest values of P and k percentage in pepper leaves were obtained with applying $3m^3$ of compost in both seasons, expect P% in the first season which obtained with the application $2m^3$ of compost in the first season. El-Sheikh and Salama (1997) on tomato reported that the macro- and micronutrient contents and the uptake of these increased with chicken manure application. Hu and Barker (2004) on tomato mentioned that the agricultural waste compost (poultry manure and cranberry press cake) was more nutrient-rich compost than the other (sewage sludge biosolids, and yard waste) and generally led to higher concentrations and total accumulation of nutrients(nitrogen (N), phosphorus (P), potassium (K), calcium and magnesium) in leaves. Total plant growth was correlated with nutrient accumulation, with N accumulation giving the highest correlation with growth and K accumulation giving the lowest correlation.

Regarding to the effect of the supplements (EM or EN) on N, P and K percentage in leaves were significant in both seasons. Pepper plants treated with EM had the highest values of P and K% in both seasons. While the highest values of N% were obtained with applying enciabein (En) in both seasons. Concerning the interaction between organic fertilizers and the supplements (EM or En) ,data presented in Table (11) indicated that the values of N, P and K% significantly affected by the interaction in both seasons. The highest values of N% were obtained by the combined of $2m^3$ of chicken manure with enciabein (En) or $3m^3$ of compost with enciabein in the first and second seasons, respectively. The highest values of P and K% in leaves were obtained by applying the combined of $3m^3$ compost with EM in both seasons, except P% in the first season which showed the highest values with application the combined of $2m^3$ compost with using EM. This effect might be due to the release of nutrients from organic matter when EM was applied as reported by Yadav (1999) and Sangakkara and Weerasekera (2001). Ghoname.and Shafeek (2005) reported on pepper ,application of organic manure (chicken manure at high rate) combined with biofertilizer and mineral N resulted in increasing N, P and K contents of plant.

As regard to the effect of enciabein, Awad, *et al.* (1987) stated that urea formaldehyde increased dry matter and nitrogen content of tomato plants.

It can concluded that sweet pepper plants fertilized by the combined $3m^3$ of compost with EM or 2 m^3 of compost with EM increased total yield of fruits by 98% and 73%, respectively in the first season and 67% and 50%, respectively in the second seasons as comparing with applying 2 m^3 chicken manure alone. Inoculation organic fertilizers (chicken manures or compost at different levels) with EM reduced nitrate accumulation in fruits of pepper plants.

Table (11): Effect of organic fertilizers, effective microorganisms (EM) and enciabein (En) on N%, P% and K % in leaves at 50 days after transplant in seasons 2006-2007 and 2007-2008.

Organic manure	Supplem-ents	2006-2007			2007-2008		
		N%	P%	K%	N%	P%	K%
chicken $2m^3$		1.42	0.415	2.41	0.86	0.479	2.10
Compost $1m^3$		1.22	0.444	2.00	0.71	0.389	2.29
Compost $2m^3$		1.19	0.533	2.13	0.82	0.421	2.29
compost $3m^3$		1.31	0.496	2.26	1.00	0.511	2.39
LSD		0.115	0.0816	0.063	0.266	0.083	0.052
	Without	1.14	0.314	1.98	0.73	0.310	2.00
	EM	1.34	0.561	2.38	1.00	0.589	2.62
	En	1.37	0.451	2.24	0.91	0.450	2.19
	LSD	0.106	0.039	0.055	0.145	0.0547	0.091
chicken $2m^3$	Without	1.15	0.270	2.11	0.78	0.399	1 83
	EM	1.48	0.587	2.59	0.98	0.580	2.43
	En	1.62	0.389	2.52	0.81	0.458	2.06
Compost $1m^3$	Without	1.04	0.261	1.77	0.61	0.252	1.98
	EM	1.31	0.617	2.24	0.71	0.536	2.74
	En	1.31	0.455	2.00	0.82	0.377	2.14
Compost $2m^3$	Without	1.07	0.353	1.91	0.61	0.281	2.04
	EM	1.27	0.737	2.31	0.93	0.546	2.50
	En	1.24	0.509	2.17	0.93	0.437	2.34
compost $3m^3$	Without	1.30	0.371	2.14	0.93	0.307	2.14
	EM	1.31	0.664	2.37	0.98	0.693	2.80
	En	1.31	0.452	2.27	1.09	0.529	2.21
LSD		0.212	0.099	0.109	0.289	0.1095	0.128

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تاثير الاسمده العضويه والكائنات الدقيقه النافعةوالسماد البطئ التحلل على نمـو ومحصول وجودة الفلفل تحت الصوب

امل محمد فراج * ، محمد محمد شاهين *، سعيد محمد قبيل **وسعودى محمد محمد**
*** قسم الخضر كلية الزراعة جامعة القاهرة**
****معهد بحوث البساتين اقسام بحوث الخضر – قسم الزراعة المحمية**

أجريت تجربتين حقليتن خلال موسمي الزراعـة ٢٠٠٦-٢٠٠٧ و ٢٠٠٧-٢٠٠٨ فـي محطة التجارب الزراعية بقها بمحافظة القليوبية معهد بحوث الخضر على نبات الفلفـل (صـنف سونار) لدراسة تأثير استخدام الأسمدة العضوية مثل سماد مخلفات الدواجن بمعدل ٢م^{3} والكمبوست بمعدل ١ ، ٢، ٣ م^{3} / للصوبة وأيضا عدم الإضافة أو إضافة السماد الحيوي والسماد النتروجين بطيء التحلل يوريافورمالدهيد (أنسيابين) على صفات النمو الخضري (بعـد ٧٥و ١٥٠ يـوم مـن الشتل) والمحصول المبكر والكلي / م^{2} وصفات الثمرة ومحتوياتها مـن المـادة الـصلبة الذائبـة وحمض الاسكوربيك وتراكم النترات.

استعمال ٣م^{3} كمبوست ادي لزيادة معنوية وأعلى القيم لطول النبات وعدد الفروع وعـدد الأوراق ومساحة الأوراق الكلية والوزن الطازج والجاف للأوراق والـساق للنبـات والمحـصول المبكر والكلي ومتوسط وزن الثمرة وفيتامين ج. لايوجد تأثير معنوي للاسمدة العضوية على طول النبات العينة الثانية في الموسم الأول و للعينة الأولى والثانية في الموسم الثاني وعدد الفروع للعينة الثانية في الموسم الثاني ووزن ثمارالمحصول المبكر وعدد الثمار للمحـصول الكلـي / م^{2} فـي الموسم الثاني وأيضا على النسبة المئوية للمادة الجافة والمادة الـصلبة الذائبـة وسـمك اللحـم للثمارفي الموسمين. إضافةالتسميد الحيوى EM له تأثير معنوى وأعطى أعلى القيم بليه أنـسيابين على كل صفات النمو الخضري والمحصول الكلي والمبكر ونوعية الثمار في الموسـمين.أعلـى محصول كلي حصل عليه باستعمال ٣م^{3} كمبوست مع EM بليه ٢م^{3} كمبوسـت مـع EM فـي الموسمين مع زيادة بنسبة ٩٨ % و ٧٣% في الموسم الأول و ٦٧ % ، ٥٠ % في الموسم الثاني مقارنة باستعمال ٢م^{3} سماد دواجن بمفرده. إضافةالتسميد الحيوى EM لسماد الدواجن اوللمعدلات المختلفة من الكمبوست خفض تراكم النترات فى ثمار الفلفل