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EFFECT OF NATURAL, ORGANIC FERTILIZERS AND MAGNETITE (IRON OXIDE) ON GROWTH AND YIELD OF PEPPER PLANTS UNDER PLASTIC HOUSE CONDITIONS

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ABSTRACT : *This research was carried out to compare the effect of natural and organic fertilizers sources and chicken manure as a control on pepper plants cv. Khairat. The experiment was conducted at Kaha research station ,Horticulture research Institute ,Kalubia governorate during two autumn seasons of 2008\2009 and 2009\2010 under plastic house conditions. Two natural fertilizer sources magnetite and Felesbar with two rates from each one i.e. 75 an 150 kg per feddan were used and two organic sources i.e. chicken manure and biogreen compost with two levels of organic sources i.e. 10m^3 and 20m^3 per feddan compared with 20m^3 per feddan chicken manure (control).The experimental design was complete randomized blocks with four replicates. Each replicate contained 10 plots representing the treatments. The results showed that (CH2+M2) chicken manure (20m^3) plus magnetite (75kg) led to increase significantly macro elements percent and micro element (ppm) in sweet pepper plant tissues than the other rates and sources used. Similar results were recorded for fruits analyzed for micro elements. (CH2+M2) expressed greater plant height, leaf number, leaf area, fresh and dry weight than the other treatments including control. Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed. (CH1+M1) gave the highest early ,total yield, and average fruit weight .Similarly fruit length, and diameter beside, carbohydrate ,vitamin C and TSS were increased significantly with by (CH2)chicken manure of 20m^3 per feddan plus (M2) magnetite of 75kg per feddan.*

Key words:- *Chicken manure, biogreen compost, Magnetite, Felesbar, Sweet pepper cv . Khairat, Micro Elements, Total yield, Vitamin C, and TSS , Plastic house conditions.*

INTRODUCTION

Sweet pepper plants are cultivated both in summer and winter seasons in (partially climate control) plastic houses. But unsuitable environmental conditions (temperature, high, humidity and nutrition) resulted is unacceptable fruit and cause decreasing in both fruit set and quality, especially hot months .Under high temperature conditions, sweet pepper plant produced small and unacceptable fruit and also crop of flowers and

newly fruit set .Which reflect in lower productivity and marketable yield, so the price of yield is very high in this days *Hasanein et al (2007)*.

Organic fertilizers such as chicken and pigeon manure are mainly used to keep the soil in good condition and provide the plants with the essential macro and micro nutrients especially in sandy soil. This needs more studies to determine the optimum rate of organic and inorganic fertilizer which play an important role in sweet pepper production under plastic house conditions.

Organic fertilizers improve soil structure which encourage the plant to have better root system and better crop in Egypt ,there have been several governmental initiatives to reduce the use of agrochemicals by organic fertilizers. *Allison (1973)* reported that animal manures and crop residues are of utmost importance in maintaining the fertility and productivity of agriculture soils .*Montasser (1987)* showed that soil available nitrogen increased with the application of different organic manures. Sandy soils occasionally responded to organic amendments and produced better yield .Regarding crop production, *El- Halawany et al (1991)* indicated that compost application increased total fruit weight of peanut plant. During composting organic wastes are decomposed by microorganisms plant nutrients are mineralized into plant available forms *(Parr and Homick (1992)* . When applied as a soil amendments ,compost can improve the soil organic content the water and nutrient retention in soils susceptible to macro and micro nutrients. (*Rynk 1992)* . Besides ,*Awad (1994)* pointed that the importance of organic matter to Egyptian agriculture comes directly need to water improve their physical and chemical properties and for provide plants with nutrients .*Midan (1995)* indicated that increasing organic manure up to 45 m^3 farmyard manure \feddan significantly increased of vitamin C , TTS, and acidity contents of fruit sweet pepper plants. *Hasanein (1996)* reported that addition of oganic manure chicken manure at a rate of 20m^3 per feddan increased significantly fruit length ,fruit diameter and fruit yield of sweet pepper plants. However, *Abd- Allah et al (2001)* found that the increase in fruit yield accompanied the high organic fertilizer rate 45 m^3 chicken manure \ feddan might be due to the increase of the vegetative growth ,dry matter and vitamin C of plants which consequently lead to a higher early and total yield of tomato plants. Also, *Abdel- Kader (2002)* indicated that using 30m^3 chicken manure per feddan significantly increased length, diameter of secondary crown ,fresh and dry weight of strawberry plants. *Negm et al (2002)* found that wheat grain and straw yield significantly increased by application of 1.5 or 3 tons bio- compost per feddan .Organic manure (bio- compost or compost) improves the physical properties of the soil and increase the supplying power of available nutrients to plants *Ali et al (2003)* .Also, *Hasanein and Kabeel (2006)* reported that potato yield significantly increased by application biogreen compost per feddan gave the highest vegetative growth and total yield. Moreover, *Hasanein and Gaafer (2006)* indicated that

using 20 m3 \ feddan improve the physical , chemical and watermelon total yield . *Hasanein and Gaafer (2006)* showed that compost at a rate of 5 ton per feddan led to increase significantly micro and macro elements percent in cantaloupe plant tissue than the other rates and sources used. Also, *Hasanein (2007)* found that strawberry plants significantly increased by application of 10 tons of biogreen compost or 10 tons of chicken manure per feddan increased leaves contents of NPK and some micronutrients and yield and its components than the other treatments.

Differential thermal analyses suggested that the enhanced reactivity of the soil and sediment magnetite may be due to altered grain surfaces. Since detrital magnetite is a common constituent of the sand and silt fractions of many soils and sediments, care should be exercised when evaluating "amorphous" iron data obtained by any of the popular oxalate procedures. *(Rhoton et al 1981)* . Moreover, *Liebe et al (1990)* reported that Metallographic examinations led to the conclusion that the formation of a protective magnetite layer had been disturbed. Causes of this are discussed and remedial measures are described.

Magnetite is the most magnetic of all the naturally occurring minerals on earth and these magnetic properties led to lodestone being used as an early form of magnetic compass. Magnetite typically carries the dominant magnetic signature in rocks and so it has been a critical tool in pale magnetism a science important in discovering and understanding plate tectonics *Renik et al (2005)*. *John (2005)* indicated that using magnetic water and magnetite in the soil to stimulate the growth of plant .I have had some very exciting results in plant growth related to magnetite in the soil or watering plants with magnetic water so I feel it time to write about it now. *Cranfield et al (2004)* We show, apparently for the first time, that biogenic magnetite, a ferrimagnetic iron oxide, is present in C. elegancy. Its presence may have confounding effects on experiments involving electromagnetic fields as well as implications for the use of this nematode as a model system for iron biomineralization in multicultural organisms. Also, *Graham et al (2003)* The results demonstrated that P from amended magnetite is accessible for uptake by plants and leach ate was reduced using P-magnetite compared to a constant liquid feed.

Magnetite particles (Fe3O4), which have magnetic properties, were used to introduce the GUS reporter gene into mature maize pollen via particle bombardment *Horikawa et al (1997)*. However, *Kukier et al (2003)* indicated that Solubility of most elements was higher in the non-magnetic than in the magnetic fractions of alkaline fly ashes at comparable pH. Calcium was associated with the non-magnetic fraction of the alkaline fly ashes which resulted in a higher pH buffering capacity of this fraction. *Violante et al (2003)* indicated that Iron ions are liberated into soil solution by acidic weathering of

minerals and then precipitated either locally or after translocation in soil environments..

The aim of the present study was to investigate the effect of some natural soil amendments on some physical properties of house plastic conditions and yield of pepper plants.

MATERIALS AND METHODS

This experiment was carried out at Kaha research farm Horticulture Research Institute Kalubio governorate during two seasons of 2008\2009 and 2009\2010 under plastic house conditions to study the effect of different natural (magnetite) , organic fertilizers (chicken manure and biogreen compost) on growth ,yield and fruit quality .Sweet pepper cv . Khairat seed were sown on August 15th 2008 and on August 10th 2009 in a nursery .Seedling transplanting took place on September 20th 2008 and on September 15th 2009 under plastic house conditions.

Treatments:-

The experiment included ten treatments ,as follows:

1= Compost Biogreen at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed. (CB1+M1)
2= Compost Biogreen at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/fed. (CB1+F1)
3= Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed.(CH1 +M1)
4=Chicken manure at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/ fed. (CH1 +F1)
5=Compost Biogreen at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.(CB2+M2)
6= Compost Biogreen at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/fed. (CB2+F2)
7=Chicken manure at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed. (CH2 +M2)
8= Chicken manure at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/ fed. (CH2 +F2)
9= Compost Biogreen at a rate of (20m^3/ fed.) CB
10 = Chicken manure at a rate of (20m^3/ fed.) Control

Soil treatments:

Two sources of organic fertilizers (chicken manure , compost biogreen) and natural fertilizers (magnetite , Felesbar) were used .Two levels of each sources were added in rows with dimensions of 20 m length ,50 cm deep and 80cm wide .The trenches rows were filled with 10 or 20 m^3 of compost or chicken manure from each source per feddan compared with 20m^3 of chicken

manure per feddan (control). A complete randomized block design with four replicates were used. Each replicates had ten plots representing the treatments . Table (1 and 2) described the physical and chemical soil properties and chemical of organic manure.

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

2008														
particle size distribution			texture	PH	EC	C/N	$CaCO_3$	OM	mg\kg soil					
sand	silt	clay			ds\m	ratio	%	%	N	P	K	Fe	Zn	Mn
14.1	16.3	69.6	clay	8.1	2.39	22.5	2.62	23.7	10.8	12.9	51.4	2.46	1.43	1.31
2009														
15.5	15.6	68.9	clay	8.3	2.47	23.8	2.74	25.1	11.7	13.4	55.9	2.5	1.57	1.41

Table (2) Some chemical characteristics of the studied organic fertilizers.

2008										
organic manure	PH	EC ds\m	C/N ratio	$CaCO_3$ %	OM	humidity	organic C %	N %	P %	K %
CB	8.86	1.45	1:15	3.27	21.3	12.1	33.7	0.86	2.31	1.71
CH	8.64	3.92	1:18	3.41	28.6	14.1	18.1	2.32	1.78	1.29
2009										
CB	8.53	1.59	1:14	3.64	24.5	11.5	29.8	1.11	1.64	1.63
CH	8.39	4.22	1:19	4.28	30.9	13.8	20.4	2.49	1.37	1.38

Drip irrigation and other culture practices such as basic fertilization and pesticides were applied as recommended by ministry of agriculture , chemical analysis were carried out at soil and water research institute , Agriculture Research Center (ARC).

Measurements:-

1- **Plant height (cm) from the cotyledon level to the main stem apex.**
2- **Leaf number was counted at intervals of 4 weeks and total number of leaves per plant was recorded.**
3- **Leaf area (cm2) was measured of the 5^{th} true leaf by using laser leaf area meter.**
4- **Plant fresh weight (g).**
5- **Plant dry weight (g) plant sample was dried at 70 C^0.**

Chemical composition :-

1- Macro (%) and micro elements (ppm) in sweet pepper plants.
2- Total soluble solids (TSS) of fruit was measured by hand refractometer
3- Vitamin C content (ascorbic acids) of fruit was determined according to *(A.O.A.C.1991).*
4- Chlorophyll content was determined according to *Ogiwara et al (1998)* .

Plant and soil sample dried and analyzed according to the standard of *Chiappmann and pratt (1961), Jackson (1973)* and *Pagl (1982)* .

Yield and its components:-

1- Early yield kg per plant.
2- Total yield kg per plant.
3- Average fruit yield (g).
4- Number of fruit per plant.
5- Total yield ton per feddan.
6- Fruit length (cm) ,diameter (cm) and shape index.
7- Flesh thickness (cm).

Statistical analysis

All obtained data were subjected to statistical analysis for variance by using complete randomized block design method as mentioned by *Gomez and Gomez (1984)* for calculating the least significant differences between treatments.

RESULTS AND DISCUSSION

1- Vegetative growth parameters of sweet pepper plants:-

a- Plant height

Results of the effect of some natural ,organic fertilizers and magnetite on sweet pepper vegetative growth (plant height , leaf area, number of leaves ,fresh and dry weight) were recorded in Table (3) .Data show greater plant height was obtained by using (CH2+M2) chicken manure at a rate of 20 m^3 per feddan + magnetite at a rate of 75 kg per feddan than any other treatments used in both seasons. In other words, applying (CH1+M1) gave the highest values of plant height 160.5cm followed by 20m^3 per feddan (chicken manure). While adding (CB1+F1) compost showed resulted in 155.0cm ,(CB2+M2) compost gave 149.7cm with significant difference between the treatments.

b- Leaf area

Leaf area was lowest for plant grown in (CB1+M1) compost whereas plants grown in (CH2+M2) , (CH1+M1) or (CB1+F1) compost produced the

greatest leaf area in both years of work (Table 3). The increase in leaf area for plants grown in available substrates may be attributed to several advantages i.e. reducing EC and PH values in the soil and increasing nutrient uptake.

Table (3): Effect of natural, organic fertilizers and magnetite on vegetative growth of pepper plants under plastic house conditions.

Treatments	Plant height (cm)	leaf area (cm^2)	No. of leaves per plant	No. of branches \ plant	fresh weight (g) \ plant	dry weight (g) \ plant
season 2008						
CB1+M1	87.6	148.4	114.0	9.0	232.0	27.0
CB1+F1	155.0	162.0	173.7	14.8	353.7	47.4
CH1+M1	160.5	163.3	181.1	15.1	365.3	50.7
CH1+F1	126.4	155.9	140.8	13.0	298.5	35.9
CB2+M2	149.7	160.5	166.2	14.2	333.9	44.1
CB2+F2	115.1	153.2	135.9	11.8	274.0	32.8
CH2+M2	164.3	165.7	185.3	15.8	376.1	54.3
CH2+F2	142.8	158.1	157.5	13.7	321.4	41.2
CB	103.9	151.6	127.6	10.6	254.2	30.7
CH (Control)	133.2	156.8	149.4	13.3	307.8	38.6
L.S.D at 0.05	3.47	5.23	7.29	1.18	9.34	2.18
season 2009						
CB1+M1	97.7	122.5	122.0	10.4	263.4	28.6
CB1+F1	149.2	174.9	165.9	13.4	343.0	51.8
CH1+M1	155.8	182.3	171.4	13.9	349.9	55.3
CH1+F1	123.7	143.1	141.1	12.5	314.8	37.0
CB2+M2	144.6	166.8	158.8	13.4	338.5	48.5
CB2+F2	114.9	136.6	135.6	12.2	304.3	34.2
CH2+M2	159.4	187.2	177.3	14.3	356.7	59.1
CH2+F2	140.2	157.7	151.7	13.0	332.6	44.9
CB	105.4	131.0	129.5	11.9	286.2	31.7
CH (Control)	131.5	151.2	146.2	12.7	321.1	41.4
L.S.D at 0.05	8.45	7.43	6.19	1.04	11.6	1.39

CB1+M1= Compost Biogreen at a rate of (10 m^3/fed.)+Magnetite at a rate of 150 kg/fed.
CB1+F1 = Compost Biogreen at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/fed.
CH1 +M1= Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed.
CH1 +F1=Chicken manure at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/ fed.
CB2+M2=Compost Biogreen at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CB2+F2 = Compost Biogreen at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/fed.
CH2 +M2=Chicken manure at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CH2 +F2= Chicken manure at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/ fed.
CB= Compost Biogreen at a rate of (20m^3/ fed.)
Control = Chicken manure at a rate of (20m^3/ fed.)

c- Number of leaves

Superiority of (CH2+M2) or (CH1+M1) organic fertilizers and magnetite on plant leaf number was observed in Table (3). Both 10 or 20m^3 (chicken manure) or 75 or 150 kg per feddan (magnetite) gave higher number of leaves compared with control plant in both seasons of study. Generally, the lowest number of leaves obtained for plants grown with 10m^3 compost biogreen and 150kg magnetite per feddan.

d- Fresh and dry weight per plant.

Responses of the fresh and dry weight per plant of sweet pepper leaves to natural ,organic fertilizers and magnetite are illustrated in Table (3). The results indicated that applying (CH2+M2) or (CH1+M1) organic fertilizers and magnetite added to the soil had significant effect on leaves fresh and dry weight compared with other treatments at sampling data. The highest values of leaves fresh and dry weight were obtained under (CH2+M2) and (CH1+M1) chicken manure and magnetite and recorded 376.1 and 365.3 gm respectively. The lowest values were 254.2 and 232.0 gm respectively under compost biogreen (CB) and (CB1+M1) with significant effect during the two seasons.

Using natural, organic fertilizers and magnetite in clay soil improves the soil texture . The structural improvement can encourage the plant to have a good root system and the soil fertility which leads to a higher plant vegetative growth. The increase vegetative growth for plants grown in available substrate may be attributed to several advantages i.e. reducing EC and PH values in the soil and increasing nutrient uptake. The data agreement with *Allison (1973), Parr and Homick (1992), Rynk (1992) , Hasanein (1996)* on sweet pepper ,*Abd- Allah et al (2001)* on tomato, *Abdel- Kader (2002)* on strawberry, *Negm et al (2002)* on wheat, *Ali et al (2003), Hasanein and Kabeel (2006)* on potato.

2- Chemical analysis of sweet pepper plants:-

Sweet pepper plant analysis for N,P, and K % with some micro elements Fe and Mn (ppm) was investigated in Table (4). Results showed that application of (CH2 and CH1) plus (M2 and M1) gave the highest values of N,P, and K % in sweet pepper plants with significant effect compared with the other treatments. And control. The values of N,P, and K percentage under (CH2+M2) are 5.64, 0.67 and 4.25% in the first season respectively. The control (chicken manure) treatments gave 5.04, 0.50 and 3.61 in the first season respectively .The lowest concentration of N,P, and K were observed under applying (CB1+F1) compost biogreen at a rate of 10m3 per feddan plus felesbar at a rate of 150kg per feddan .The data were in harmony with *Liebe et al (1990), Rhoton et al (1981), Renik et al (2005) , John (2005)* and *Hasanein (2007)* on strawberry.

Table (4): Effect of natural, organic fertilizers and magnetite on macro and micro nutrients of leaves plant under plastic house conditions.

	season 2008					Season 2009				
treatments	N %	P %	K %	Fe ppm	Mn ppm	N %	P %	K %	Fe ppm	Mn ppm
CB1+M1	3.21	0.55	3.87	320	34	3.08	0.51	4.08	317	38
CB1+F1	2.59	0.40	3.26	247	24	2.39	0.35	3.40	236	27
CH1+M1	3.51	0.64	4.17	359	42	3.42	0.62	4.36	353	45
CH1+F1	3.13	0.53	3.74	307	33	2.96	0.48	3.91	301	35
CB2+M2	1.64	0.67	4.25	372	45	1.53	0.63	4.47	361	48
CB2+F2	2.77	0.43	3.38	366	26	2.56	0.39	3.54	250	30
CH2+M2	3.33	0.59	3.98	331	37	3.18	0.56	4.15	328	40
CH2+F2	3.42	0.62	4.09	344	40	3.29	0.58	4.24	339	43
CB	2.92	0.47	3.52	375	28	2.74	0.41	3.65	264	32
CH (Control)	3.04	0.50	3.61	293	31	2.86	0.44	3.83	285	34
L.S.D. at 0.05	0.27	0.04	0.26	9.1	2.8	0.69	0.02	0.37	7.4	1.6

CB1+M1= Compost Biogreen at a rate of (10 m^3/ fed.)+Magnetite at a rate of 150kg/fed.
CB1+F1 = Compost Biogreen at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/fed.
CH1 +M1= Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed.
CH1 +F1=Chicken manure at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/ fed.
CB2+M2=Compost Biogreen at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CB2+F2 = Compost Biogreen at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/fed.
CH2 +M2=Chicken manure at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CH2 +F2= Chicken manure at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/ fed.
CB= Compost Biogreen at a rate of (20m^3/ fed.)
Control = Chicken manure at a rate of (20m^3/ fed.)

3- Chemical analysis of sweet pepper fruits:-

Table (5) shows that BPK(%) and Fe , Mn (ppm) contents in sweet pepper fruits .Chicken manure (20m^3) plus magnetite (75kg) significantly increased nitrogen ,potassium and phosphorus contents over control and most other tested treatments in sweet pepper fruits tissues in the first and second seasons.

Data harmony with those of *Harikawa et al (1997) ,Kukler et al (2003), Vialante et al (2003) ,Cranfield et al (2004) ,Garham et al (2003)* and *Hasanein et al (2007)* on sweet pepper .The margin curves of Fe and Mn in sweet pepper fruits. (CH2+M2) were reached to the significant point in the two years.

Table (5): Effect of natural, organic fertilizers and magnetite on macro and micro nutrients of pepper fruits produced under plastic house conditions.

Treatments	season 2008					season 2009				
	N %	P %	K %	Fe ppm	Mn Ppm	N %	P %	K %	Fe Ppm	Mn Ppm
CB1+M1	2.21	0.46	3.18	299	32	2.08	0.44	3.36	284	31
CB1+F1	1.38	0.35	2.34	217	20	1.11	0.33	2.56	205	18
CH1+M1	2.72	0.52	3.61	333	38	2.53	0.50	3.74	319	36
CH1+F1	2.05	0.43	3.09	284	29	1.82	0.41	3.22	273	28
CB2+M2	2.83	0.54	3.74	341	40	2.61	0.51	3.87	332	38
CB2+F2	1.56	0.37	2.50	228	23	1.29	0.35	2.84	221	21
CH2+M2	2.31	0.48	3.33	312	35	2.19	0.45	3.48	297	33
CH2+F2	2.56	0.51	3.47	325	36	2.37	0.48	3.59	308	35
CB	1.72	0.40	2.72	240	26	1.42	0.38	3.03	237	24
CH (Control)	1.94	0.42	2.95	266	27	1.66	0.39	3.11	256	26
L.S.D. at 0.05	0.35	N.S	0.11	7.3	1.01	0.42	N.S	0.23	4.3	0.52

CB1+M1= Compost Biogreen at a rate of (10 m^3/fed.)+Magnetite at a rate of 150 kg/fed.
CB1+F1 = Compost Biogreen at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/fed.
CH1 +M1= Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed.
CH1 +F1=Chicken manure at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/ fed.
CB2+M2=Compost Biogreen at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CB2+F2 = Compost Biogreen at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/fed.
CH2 +M2=Chicken manure at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CH2 +F2= Chicken manure at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/ fed.
CB= Compost Biogreen at a rate of (20m^3/ fed.)
Control = Chicken manure at a rate of (20m^3/ fed.)

4- Yield and its components:-

Results illustrated in Table (6) indicated that early yield was significantly increased greater with chicken manure(10m^3) plus magnetite (150kg) or (CH2+M2) than any other treatments used in this experiment in both years of study.

The average increment of total yield were 9.27,8.82 and 7.50 kg per plant (CH1+M1), (CB2+M2) and (CH2+M2) over any treatments and the control, respectively in both years. Meanwhile , there was no significant increments gained with compost biogreen treatment only with control .The highest yield was recorded by (CH1+M1) in the two years. Besides (CB2+M2) and (CH2+M2) gave the highest values of total yield compared with other used treatments in the two years of study. Magnetite had significantly the highest early and total yield compared with either Felesbar or compost biogreen .

Table (6): Effect of natural, organic fertilizers and magnetite on yield and its components of pepper fruits produced under plastic house conditions.

Treatments	2008\2009			2009\2010				
	early yield Kg\ plant	total yield Kg\ plant	No. of fruit \plant	average fruit weight (g)	early yield Kg\ plant	total yield Kg\ plant	No. of fruit \plant	average fruit weight (g)
CB1+M1	1.13	5.34	50.9	105	1.21	5.87	52.9	111
CB1+F1	1.31	6.44	55.0	117	1.34	7.35	52.1	141
CH1+M1	1.51	9.27	45.0	206	1.53	9.74	52.9	184
CH1+F1	1.25	5.93	53.4	111	1.30	6.79	50.7	134
CB2+M2	1.48	8.82	50.1	176	1.46	9.26	53.8	172
CB2+F2	1.06	5.05	53.7	94	1.11	5.43	51.7	105
CH2+M2	1.43	7.51	52.9	142	1.41	8.43	51.5	164
CH2+F2	1.36	7.14	59.0	121	1.38	7.83	51.5	152
CB	0.97	4.67	51.9	90	1.05	5.11	55.5	92
CH Control)	1.19	5.62	41.6	135	1.26	6.21	50.5	123
L.S.D.at 0.05	0.08	1.16	0.4	3.75	0.11	1.39	0.6	4.27

CB1+M1= Compost Biogreen at a rate of (10 m^3/fed.)+ Magnetite at a rate of 150kg/fed.
CB1+F1 = Compost Biogreen at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/fed.
CH1 +M1= Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed.
CH1 +F1=Chicken manure at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/ fed.
CB2+M2=Compost Biogreen at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CB2+F2 = Compost Biogreen at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/fed.
CH2 +M2=Chicken manure at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CH2 +F2= Chicken manure at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/ fed.
CB= Compost Biogreen at a rate of (20m^3/ fed.)
Control = Chicken manure at a rate of (20m^3/ fed.)

Regarding average fruit weight and total yield (ton\ fed.) results of Table (6) revealed that (CH1+M1) produced significantly highest fruit compared with that of other treatments .In the mean time (CH1+M1) resulted in significant increase in average fruit weight and total yield (ton\ fed.) compared with other treatments and control. The increase of fruit yield due to applying the suitable organic fertilizers rate might be due to the increase of the vegetative growth and dry matter and nutrient elements content of plants which consequently led to higher early and total yield . Such data confirmed with the recorded by *Montasser (1987), El- Halawany et al (1991)* on peanut ,*Awad (1994), Midan (1995)* on sweet pepper and *Hasanein and Gaafer (2006)* on watermelon.

5- Physical and chemical components of fruits:-

Fruit Physical and chemical characteristics were tabulated in Table (7). In general fruit length and fruit diameter of (CH2+M2) and (CH1+M1) significantly higher than the other sources , rates and control treatments in the two years. (CH2+M2) and (CH1+M1) obtained firmer sweet pepper fruits than those fruit obtained from magnetite .Meanwhile ,the marked low fruit was recorded by compost biogreen .On the other hand flesh thickness(cm) no significant increase by using any treatments and control in both seasons.

Table (7): Effect of natural, organic fertilizers and magnetite on fruit physical characters of pepper plants produced or grown under plastic house conditions.

Treatments	fruit length (cm)	Fruit diameter (cm)	Shape index	Flesh thickness (cm)	Carbohydrate %	Vitamin C Mg/100g	TSS (%)
Season 2008							
CB1+M1	9.4	4.7	2.00	0.30	14.94	55.9	5.88
CB1+F1	8.9	4.4	2.02	0.29	13.87	51.7	5.15
CH1+M1	10.8	5.2	2.08	0.25	18.71	65.83	7.96
CH1+F1	9.8	4.7	2.09	0.32	15.55	58.1	6.39
CB2+M2	10.0	4.9	2.04	0.32	16.27	60.5	6.94
CB2+F2	8.5	4.1	2.07	0.27	13.42	49.3	4.81
CH2+M2	11.2	5.4	2.07	0.37	19.19	69.2	8.40
CH2+F2	10.3	5.1	2.02	0.33	17.43	63.4	7.47
CB	8.0	3.8	2.11	0.27	12.75	45.0	4.52
CH (Control)	9.1	4.5	2.02	0.30	14.83	53.4	5.53
L.S.D at 0.05	0.54	0.13	N.S.	N.S	1.17	2.54	1.37
season 2009							
CB1+M1	9.7	4.8	2.02	0.33	16.61	58.0	6.22
CB1+F1	9.0	4.5	2.00	0.30	15.37	53.5	5.34
CH1+M1	11.6	5.5	2.11	0..43	19.37	69.7	7.89
CH1+F1	10.0	4.8	2.08	0.35	17.23	61.3	6.66
CB2+M2	10.4	5.0	2.08	0.38	17.95	64.1	7.08
CB2+F2	8.6	4.2	2.04	0.28	14.40	50.6	4.83
CH2+M2	11.8	5.8	2.04	0.45	19.86	71.8	8.17
CH2+F2	11.3	5.3	2.13	0.40	18.69	66.9	7.45
CB	8.3	4.0	2.08	0.25	13.56	47.4	4.30
CH (Control)	9.4	4.6	2.04	0.31	16.08	55.2	5.73
L.S.D at 0.05	0.42	0.09	N.S	N.S	1.06	1.93	1.21

CB1+M1= Compost Biogreen at a rate of (10 m^3/fed.)+Magnetite at a rate of 150 kg/fed.
CB1+F1 = Compost Biogreen at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/fed.
CH1 +M1= Chicken manure at a rate of (10 m^3/ fed.)+ Magnetite at a rate of 150 kg/ fed.
CH1 +F1=Chicken manure at a rate of (10 m^3/ fed.)+ Felesbar at a rate of 150 kg/ fed.
CB1+M2=Compost Biogreen at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CB1+F2 = Compost Biogreen at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/fed.
CH1 +M2=Chicken manure at a rate of (20m^3/ fed.)+ Magnetite at a rate of 75 kg/ fed.
CH1 +F2= Chicken manure at a rate of (20m^3/ fed.)+ Felesbar at a rate of 75 kg/ fed.
CB= Compost Biogreen at a rate of (20m^3/ fed.)
Control = Chicken manure at a rate of (20m^3/fed.)

Both carbohydrate % ,vitamin C and TSS% had similar trend .Similarly (CH2+M2) and (CH1+M1) gave significantly greater carbohydrate % ,vitamin C and TSS% compared with the other treatment and control These results could be explained through the effect of the availability of natural fertilization on the accumulation of sugar .Data were in harmony with those of *Awad (1994) ,Midan (1995),Hasanein(1996)* they working on sweet pepper, *Abdel – Kader (2002)* on strawberry and *Hasanein and Gaafer (2006)* on watermelon.

REFERENCES

Abdel- Allah, M., S. M. Adam and A. F. Abou- Hadid (2001). Response of some tomato hybrid to the organic fertilizer under newly reclaimed soil conditions. Egypt J. Hort. 28 (3) ;341-353.

Abdel- Kader, A. E. (2002). Effect of some organic and mineral fertilizers on some potato cultivars. M. Sci. Thesis Fac. Agric. Mansoura Univ. Egypt.

Ali, K. H. L., E. T. Wafaa, T. Elete and E. L. Elham (2003). Evaluation of application of bacterial inoculate for straw during compost process under aerobic conditions. J. Agric. Sci. Mansoura Univ. 28: 5787- 5801.

Allison, F. E. (1973). Soil organic matter and its role in crop production. Publ. New York, USA.

A. O. A. C. (1991). Official methods of analysis 12th ed. Association of official analysis chemists. Washington DC.

Awad, A. M. A. (1994). Crop residues effects on soil organic matter ,wheat yield and nutrients dynamics. Ph. D. Thesis, Fac. Agric. Univ. Egypt.

Chapman, H. D. and F. Pratt (1961). Method of analysis for soil. Plant and Water Calif. Univ. USA.

Cranfield, C. G., A. Dawe, V. Karloukovski, R. F. Dunin, D. Pomeral and J. Dobson (2004). Biogenic magnetite in the nematode caenorhabditis elegance. Proc. For Sci. and Tech. in London Ser. Sci. 436-439.

El- Halawany, K.S., M. A. Abdel –Raheem and A. E. Ibrahim (1991). Effect of compost application on sandy soil properties and yield peanut plants. Zagazig J. Agric. Res. ,Egypt. Vol. 890- 896.

Gomez, K. A. and A. A. Gomez (1984). Statistical procedures for agricultural research .Joho Wiley and Sons Inc. New York 680 pp.

Graham, A., J. H. Gillman and C. J. Rosen (2003). Lettuce growth and phosphorus leaching in media amended with phosphorus treated magnetite. Acta Hort . Vol. (627) :165-169.

Hasanein, N. M. (1996). Studies of sustainable agriculture for some vegetable crops using animal manure .M. Sc. Thesis, Fac. Agric. Ein Shams Univ. Egypt.

Hasanein, N. M. (2007). A comparison between the effect of compost and chicken manure fertilizers on productivity and fruit quality of two strawberry cultivars grown under transparent polyethylene low tunnels. Minufiya, J. Agric. Res. Vol. 32(2); 419-440.

Hasanein, N. M., D. M. A. Fayza and T. B. Ali (2007). Studies on some materials for improving fruit set and quality of sweet pepper grown under high temperature .J. Agric. Sci. Mansoura Univ. 32(7) :5487- 5494.

Hasanein, N. M. and S. A. Gaafar (2006). A comparative study of some compost sources on cantaloupe plants grown under transparent polyethylene low tunnels. Minufiya, J. Agric. Res. Vol. 31(2); 509-521.

Hasanein, N. M. and S. M. A. Kabeel (2006). Increasing potato productivity grown in sandy soil. through organic and biofertilizers application. J. Agric. Sci. Mansoura Univ. 31(2) :951-962.

Horkawa, Y., T. Yoshizuni and H. Kakuta (1997). Transform ants through pollination of mature maize pollen delivered bar gene by particle gun. Grassland Sci. 1997;43(2) :117-123.

Jackson, M. (1973). Soil chemical analysis prentice hall of India private Limited New Delhi 18 pp.

John, G. (2005). The magnetite properties of particle deposited on platanus x hispanica leaves in Madrid. Sc. of the total environmental. 382(1) : 135-146.

Kukier, U., C. H. Fauziah, M. E. Sunner and W. P. Miller (2003). Composition and element solubility of magnetic and non- magnetic fly ach fractions. Environ. Pollution , 123 (2): 255-266.

Liebe, W., L. Braunstein and D. Fromm (1990). Problems with the magnetite layer in primary waste heat boiler and auxiliary boiler. Ammonia Plant Safety and Related Facilities, 30:113-121.

Midan, S. A. (1995). Response of some promising pepper gene types to different cultural treatments. M. Sci. Thesis, Fac. Agric. Minufiya Univ. Egypt.

Montasser, S. Y. B. (1987). Organic. Manures and behavior of cartain elements in Egyptian soils with a special reference to response of grown plants. Ph.D. Thesis, Fac. Agric. Ain Shams Univ. Egypt.

Negm, M. A., M. H. El- Sayed, A. S. Ahmed and M. M. Abdel- Gani (2002). Wheat and sorghum response to bio compost and sulfur added to a calcareous soil. Zagazig J. Agric . Res. 29:1973-1985.

Ogiwara, I., G. H. Habutsu, N. Hakada and I. Khimura (1998). Soluble sugar content in fruit of nine wild and forty one cultivated strawberries .J. of the Japanese Soc. for Hort. Sci. 67(3):406- 412.

Parr, J. F. and S. B. Homick (1992). Agricultural use of organic amendments. A historical perspective Amer. J. Alternative Agric. 7:181-189.

Pagl, A. L. (1982). Method of soil analysis .Part2 chemical micro biological properties. SSSAP Inc. Madison Wisconsin, USA.

Renik, E. L., P. M. P. Garcia and N. Oritiz (2005). Using magnetite to fix toxic compounds solubillized from solid residues produced at lead smelting plant. Eng. Sanitaria Ambiental, 12(3) :343-350.

Rhoton, F. E., J. M. Bigham, L. D. Norton and N. E. Smeck (1981). Contribution of magnetite to oxalate extractable iron in soils and sediments from the Maumee River Basin of Ohio .Soil Sci. of Am. J. 1981,45 (3): 645-649.

Rynk, R. F. (1992). On farm composting hand back north east regional .Agric. Eng. Ser. (NRAES- 34) L theca .NY.

Violante, A., E. Barberies, M. Pigna and V. Boero (2003). Factors affecting the formation , Nature and properties of iron precipitation products at the soil-root interface .J. of Plant Nutrition , 26 (10/11) :1889-1908.

تاثير مستويات الأسمدة الطبيعية والعضوية والماجنتيت (أكسيد الحديد المغناطيسي) على نمو ومحصول الفلفل تحت ظروف الصوبات الزراعية

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الملخص العربي

أجريت هذه الدراسة فى عامي ٢٠٠٩و ٢٠١٠ فى مزرعة بحوث الخضر بقها محافظة القليوبية لدراسة زيادة وانتاجية محصول الفلفل تحت الصوبات الزراعية من خلال الأسمدة العضوية والكمبوست والأسمدة الطبيعية مثل الفليسبار والماحنيتيت وكانت المعاملات كالآتى:

١- كمبوست بيوجرين بمعدل ١٠ م^{٣} للفدان + الماجنيتيت بمعدل ١٥٠ كجم للفدان.

٢- كمبوست بيوجرين بمعدل ١٠ م^{٣} للفدان + الفليسبار بمعدل ١٥٠ كجم للفدان.

٣- سماد الدواجن بمعدل ١٠ م^{٣} للفدان + الماجنيتيت بمعدل ١٥٠ كجم للفدان.

٤- سماد الدواجن بمعدل ١٠ م^{٣} للفدان + الفليسبار بمعدل ١٥٠ كجم للفدان.

٥- كمبوست بيوجرين بمعدل ٢٠ م^{٣} للفدان + الماجنيتيت بمعدل ٧٥ كجم للفدان.

٦- كمبوست بيوجرين بمعدل ٢٠ م^{٣} للفدان + الفليسبار بمعدل ٧٥ كجم للفدان.

٧- سماد الدواجن بمعدل ٢٠ م^{٣} للفدان + الماجنيتيت بمعدل ٧٥ كجم للفدان.

٨- سماد الدواجن بمعدل ٢٠ م^{٣} للفدان + الفليسبار بمعدل ٧٥ كجم للفدان.

٩- كمبوست بيوجرين بمعدل ٢٠ م^{٣} للفدان.

١٠- سماد الدواجن بمعدل ٢٠ م^{٣} للفدان.

وكانت أهم النتائج المتحصل عليها

١- استعمال سماد الدواجن بمعدل ٢٠ م^{٣} للفدان والماجنيتيت بمعدل ٧٥ كجم للفدان أعطى أعلى نمو خضري (طول النبات والوزن الطازج والجاف لكل من الأوراق والسيقان وعدد الأوراق ومساحة الورقة) بينما استخدام كمبوست بيوجرين بمعدل ١٠ م^{٣} للفدان مع الماجنيتيت بمعدل ١٥٠ كجم للفدان أعطى اقل نمو حضري.

٢- استخدام ٢٠ م^{٣} لكل فدان من سماد الدواجن و٧٥ كجم لكل فدان من الماجنيتيت أدى الى الحصول على أعلى تركيز من العناصر الكبرى والصغرى محل الدراسة فى نباتات الفلفل والثمار.

٣- تم الحصول على أعلى تركيز من الكربوهيدرات وفيتامين C والمواد الصلبة الكلية بإضافة سماد الدواجن بمعدل ١٠ م^{٣} للفدان مع الماجنيتيت بمعدل ١٥٠ كجم للفدان بالمقارنة بالمستويات الأخرى والكنترول.

٤- استخدام سماد الدواجن بمعدل ١٠ م^{٣} للفدان مع الماجنيتيت بمعدل ١٥٠ كجم للفدان أعطى أعلى محصول كلى ٩,٢٧ كجم لكل نبات ومتوسط وزن الثمرة ٢٠٦ جم ومحصول كلى ١٨,٣٦ طن لكل فدان بينما أعطى كمبوست بيوجرين اقل محصول كلى ٤,٦٧ كجم لكل نبات ومتوسط وزن الثمرة ٩٠ جم ومحصول كلى ١٠,٣٨ طن لكل فدان بمعدل ٢٠ م^{٣} للفدان.