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GROWTH AND PRODUCTIVITY OF SWEET PEPPER AS INFLUENCED BY NITROGEN FERTILIZATION SOURCES AND FOLIAR SPRAY WITH SOME GROWTH STIMULANTS UNDER PLASTIC HOUSES CONDITIONS

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ABSTRACT: This experimental was carried out during the two winter seasons of 2019/2020 and 2020/2021 in a private unheated plastic houses,, Kom Haleen, Menia El Qamh District, Sharkia Governorate, Egypt, to study the effect of different sources of nitrogen fertilizer as soil application and some growth stimulants as foliar application on growth and yield of sweet pepper (*cv.* Lirica RZ) grown in clay soil using drip irrigation system. Results showed that, the interaction between fertilization sweet pepper plants with vermicompost at 1.225 kg/m^2 (as organic nitrogen 100%) and foliar spray with compost tea at 10 ml/l increased dry weight of leaves, stems and shoots/plant at 80 and 100 days after transplanting in both seasons, number of fruits/ plant and total yield/plant followed by the interaction between vermicompost and spraying with vermicompost tea at 7.5 ml/l. Generally, the interaction between fertilization of plants with vermicompost +FYM at 0.613+2.100 kg /m^2 as organic nitrogen (50% +50 % of each) and spraying with compost tea at 10 ml/l increased N,P and K in leaves and stems and average fruit weight.

Key words: Sweet pepper, nitrogen sources, compost tea, vermicompost tea, nano micronutrients and yield.

INTRODUCTION

Sweet pepper (*Capsicum annuum* L.) which belongs to Solananceae, is known as a vegetable, and consumed as fresh. Pepper is a good source of vitamins A, C, E, B_1, and B_2, potassium, phosphorus and calcium. Moreover, it is one of the valuable medicinal plants in pharmaceutical industries because of high amounts of antioxidant, capsaicin and capsantin as main active substances.

Nutrition plays an important role in the growth and development of any crop including capsicum, because it is known to exhibit positive response to the application of nitrogenous fertilizers particularly in light soils. Nitrogen fertilizer is an essential component of any system in which the aim is to maintain good yield **(Law and Egharevba, 2009)**. The productivity of pepper is highly responsive to N fertilizer. Application of inorganic fertilizer to agriculture is now common practice, using composts derived from various green wastes in agriculture is tardily coming back. Compost, vermicompost and farmyard manure (FYM) contains variable amounts of N, P and K and it is a valuable source of plant nutrients. Cost of inorganic fertilizers is very high and sometimes it is not available in the market right time it leads to the farmers fail to apply the inorganic fertilizers to the crop field in optimum time. In simple words, organic farming is the cultivation of crops through organic inputs with intensity to minimize the use of chemical fertilizers and pesticides that is hazardous to the environment. Organic materials can substitute for inorganic fertilizers to maintain productivity and environmental quality **(Reddy *et al*., 2017)**.

Many investigators found that about sweet pepper, addition of organic fertilizer had a major

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effect on dry weight characters (**Ewulo *et al*., 2007; Szafirowska and Elkner, 2008; Wei Lan *et al*., 2010; Fawzy *et al*. 2012; Jandaghi *et al*., 2020)** and total yield **(Awodun *et al*., 2007; Dass *et al*., 2008; Huez-Lopez *et al*., 2011; Alkharpotly, 2018)** of sweet pepper plants.

Compost or vermicompost tea is a highly concentrated microorganisms solution produced by extracting beneficial microbes from compost. It can use it as foliar or soil inoculation as organic nutrients, contain cheated micronutrients for easy plant absorption and the nutrients is in a biologically available form for both plant uptake. Compost tea is gaining importance as an alternative to chemical fertilizers and pesticides. The microbial population in the compost tea contributes toward its beneficial effectiveness. It has beneficial effects on plant growth and considered as a valuable soil amendment **(Gharib *et al*., 2008)**. In the last years, the development of new products derived from compost or vermicompost are increasing, due to their positive effects on the crops. CT is organic product obtained through a liquid-phase of compost and its extraction period ranging from few hours to two weeks, with or without active aeration with the addition of some active nutrients *i.e.*, molasses, casein, etc.**(Zaccardelli *et al*., 2012)**.

Some researchers indicated that spraying sweet pepper plants with compost tea, vermicompost tea or nano micronutrients significantly increased dry weight (**Gouda and Gahwash, 2015** on pepper**, Abo-Sedera *et al*. 2016** on snap bean**, Hameedi *et al*., 2018; Marzouk *et al*. 2019; García-López *et al*., 2019** on pepper), yield and its components **(Awalin *et al*., 2017; Singh *et al*., 2017; Harris *et al*., 2018; Ashrafi *et al*., 2019**) on sweet pepper.

Therefore, present study aimed to get information about the effect of different nitrogen fertilizer sources and some foliar stimulants such as compost, vermicompost tea and nano micronutrients on growth and yield of sweet pepper grown under plastic houses conditions.

MATERIALS AND METHODS

This experiment was carried out during the two winter seasons of 2019/2020 and 2020/2021 in a private unheated plastic houses,, Kom Haleen, Menia El Qamh Distract, Sharkia Governorate, Egypt to study the effect of different sources of nitrogen fertilizers and some growth stimulants as foliar application on dry weight, N,P and K contents and yield and its components of sweet pepper (Lirica RZ *cv.*) grown in clay soil using drip irrigation system.

The used soil properties were: Clay loam soil in texture for the average two seasons, while it had 1.27% organic matter, 8.08 pH, 0.45 mmhos/cm EC, 0.17 meq /l K_2O, 2 meq /l Mg,2 meq /l Ca, 0.87 meq /l Na, 0 meq /l CO_3, 1 meq /l HCO_3, 2.23 meq /l SO_4 and 1.8 meq /l Cl.

Chemical analysis of the farmyard manure **(**average two seasons) it had 7.8 (%) moisture, 71.47 (%) ash, 3.79 EC dS/m, 6.98 pH, 0.71 (%) N, 0.032 (%) P and 0.025 (%) K**.**

Chemical analysis of the compost (average two seasons), it had, weight of m^3 780 kg, moisture content (17 %), pH (7.14), EC (12.94 dS/m), total N (0.79%), organic matter (25.31 %), C/N ratio (1:18), total P (0.40 %) and total K (0.80%).

Chemical analysis of the vermicompost (average two seasons), it had, weight of m^3 760 kg, moisture content (51%), pH (6.99), EC (1.37 dS/m), total N (2.33%), organic matter (52.31 %), C/N ratio (1:12.89), total P (1.39 %) and total K (0.99%). All Chemical analysis were carried to in the water and environment Res. Intst., (SWERI), ARC, Egypt**.**

This experiment includes 20 treatments which were the combinations between five different sources of soil nitrogen fertilizers *i.e.*, mineral nitrogen, compost fertilizer, vermicompost fertilizer, farmyard manure (FYM) and vermicompost + FYM and foliar spraying with four growth stimulants i.e., compost tea at 10 ml/l, vermicompost tea at 7.5 ml/l, mixture of nano micronutrients (Magro Nano Mix at 0.5g/l) and spraying with water (control).

The quantities of different sources of nitrogen as shown in Schedule 1.

These treatments were arranged in a split plot design with three replicates. The sources of nitrogen fertilizers were arranged in main plots and the foliar application of growth stimulants were randomly distributed in the sub plots.

Schedule 1. Quantities of different sources of nitrogen

Fertilizers	N %	Kg/fad.	Kg/m^2
Ammonium nitrate	33.5	358.209	0.085
Compost	0.79	15190	3.617
Vermicompost	2.33	5150	1.225
FYM	0.68	17647	4.202
Vermicompost +FYM	2.33+0.68	2575+8823	0.613+2.100

The recommended rate of mineral nitrogen was 120 kg N /fad. (0.0286 kg N/m^2)

Sweet pepper seeds were sown in seedling trays (84 eyes) filled with a mixture of peat moss: vermiculite (1:1 v/v), supplemented with 300 g ammonium sulphate (20.5 % N) 400 g calcium super phosphate (15% P_2O_5), 150 g of potassium sulphate (48 % K_2O) for each, 50 kg of the mixture under nursery of plastic house on the 1st of August during both seasons of study. Seedlings of 31 days old were transplanted on the 1st of September in clay soil under unheated plastic house at 40 cm apart and 1 ml width of row.

This experiment included three unheated plastic house. The total area of plastic house were 240 m^2 (40 m long and 6 m width), 50 cm from both sides of plastic house (40 m^2) were left without planting. So, the total number of plants of plastic house were 500 plants (2.5 plants/m^2).

The plastic house contained 5 rows (40 m long and 1 m width) as main plot (five sources of nitrogen fertilizers) and each row divided into four equal divisions (10 m long and 1 m width) as sub plots (four growth stimulants).

The experimental unit area was 10.0 m^2. It contained one row 10 m long and 1 m width. Each plot included 25 plants.

All quantities of different nitrogen fertilizers were about 0.085, 3.617, 1.226, 4.202 and 0.613+2.100 kg /m^2 from ammonium nitrate, compost, vermicompost, FYM and vermicompost + FYM, respectively. Organic fertilizer were incorporated into ridge at once before one week of transplanting.

The source of vermicompost was central laboratory for Agricultural Climate (CLAM) Giza, Egypt. The source of farmyard manure was a private of animal farm, Kom Haleen, Menia El-Qamh Distract and the source of compost was Barakah Company for Organic fertilizer, Belbeis District and the source of mixture of nano micro nutrients was Modern Agric Company of Pesticides, Belbeis District. Magro Nano Mix as source mixture of nano micronutrients contained 6% Fe, 6% Zn, 5% Mn, 1%Cu, 2%B, 0.1% Mo and 4% citric acid.

The source of seeds of Lirica RZ cultivar was RZ Egypt for Importing LLc, producer: Rijk Zwaon, Holland. Different growth stimulants applications were foliar three times beginning 45 days from transplanting and 15 days intervals. The normal agricultural practices in both experiments will be carried out as commonly followed in the district.

Data Recorded

Three plants of each treatment were randomly taken at 80 and 100 days after transplanting to determine.

Dry weight

A random sample of plants from each plot was taken and dried at 70 Cº till constant weight and the dry weight of leaves, stem and shoots (leaves + stem) were determined.

Plant chemical composition

Nitrogen, phosphorus and potassium contents in leaves and stem at 100 days after transplanting in the 2nd season were determined according to the methods described by **Bremner and Mulvaney (1982), Olsen and Sommers (1982) and Jackson (1970**), respectively.

Fruit Yield and its Characteristics

Early fruit yield (kg/plant) as the fifth pickings were estimated, also average fruit weight and number of fruits/plant were recorded.

Total yield: all harvesting were picked all over the season for all plots and the following data were calculated, average number of fruits/ plant, average fruit weight (gm), total yield / plant (kg) and total yield per meter square were estimated.

Statistical Analysis

Collected data were subjected to proper statistical analysis of variance according to **Snedecor and Cochran (1980)** and the differences among treatments were compared using **Duncans'** multiple range test (**Duncan, 1958**), where means had the different letter were statistically significant, while those means followed by the same letter were statistically insignificant.

RESULTS AND DISCUSSION

Dry Weight

Effect of nitrogen fertilization sources

Fertilizing sweet pepper plants grown in plastic house with vermicompost at 1.225 kg /m^2 increased dry weight of leaves, stems and shoots/plant, followed by fertilizing with vermicompost +FYM at 0.613+2.100 kg/m^2 at 80 and 100 days after transplanting in both seasons (Table 1). Fertilizing with FYM at 4.202 kg/m^2 gave the lowest values of dry weight of leaves, stems and shoots/ plant.

Such increments in dry weight parameters in case of using vermicompost in fertilization may be due to its highest content of nutrient elements and organic matter, which may be improved both soil fertility and physical soil characteristics. In addition, vermicompost + FYM considered slow release organic fertilizer lasting long period in the soil and positively affect on vegetative growth.

These results agreement with those of **Narkhede and Banjare (2011), Aminifard *et al.* (2012), Singh *et al*. (2014) and Koshale *et al*. (2018)** they showed that fertilized sweet pepper plants with organic fertilizer significantly higher growth in dry weight per plant in comparison to mineral fertilizers.

Effect of foliar spray with some stimulants

Foliar spray with some stimulants increased dry weight of leaves, stems and shoots/ plant compared to control treatment (spraying with water) at 80 and 100 days after transplanting in both seasons (Table 1). Spraying with compost tea at 10 ml/l increased dry weight of leaves, stems and shoots/ plant, followed by spraying with vermicompost tea at 7.5 ml/l in both seasons.

The favourable effect of compost tea treatments on dry weight might be attributed to the beneficial effects of compost tea that contains many macro and micro nutrients in available form, natural hormones such as cytokines, gibberellins, indoleacetic acid, vitamins and antioxidants that be available for plant and so reflect on plant growth and its composition (**Meshref *et al*., 2010**).

These results are in accordance with those obtained by **Ashrafi *et al.* (2019)** on tomato concerning the effect of compost tea and **Ahmed and Abdelkader (2020)** on chili plants regarding nano-micronutrient. They indicated that spraying with compost tea, or nano micronutrient gave the highest values of different parts of dry weight / plant as compared to un spraying plants.

Effect of the interaction

Data in Tables 3 and 4 show that, the interaction between fertilization with vermicompost at 1.225 kg /m^2 and foliar spray with compost tea at 10 ml/l increased dry weight of leaves, stems and shoots/ plant, followed by the interaction between vermicompost and spraying with vermicompost tea at 7.5 ml/l at 80 and 100 days after transplanting in both seasons.

From the foregoing results, it could be concluded that, fertilizing sweet pepper grown in plastic house conditions with vermicompost 1.225 kg /m^2 as organic nitrogen (100%) and foliar spray with compost tea at 10 ml/l increased dry weight of leaves, stems and shoots/ plant.

Table 1. Effect of nitrogen fertilization sources on dry weight of different parts of sweet pepper at 80 and 100 days after transplanting under plastic houses conditions during 2019/2020 and 2020/2021 seasons

Treatments	Dry weight of leaves (g)		Dry weight of stem (g)		Dry weight of shoots (leaves +stem) (g)	
	Days after transplanting					
	80	100	80	100	80	100
			2019/2020 season			
Mineral nitrogen	13.35 b	19.97 b	28.08 c	45.51 c	41.44 b	65.52 c
Compost	13.32 b	19.28 c	32.11 a	51.87 a	45.44 a	71.15 b
Vermicompost	14.51 a	20.99 a	32.63 a	52.71 a	47.15 a	73.71 a
FYM	12.42 c	17.97 d	25.54 d	41.25 d	37.96 c	59.22 d
Vermicompost+FYM	14.31 a	20.70 a	30.92 b	49.96 b	45.24 a	70.66 b
			2020/2021 season			
Mineral nitrogen	13.18 c	19.68 b	28.84 c	46.55 c	42.03 c	66.23 c
Compost	13.61 bc	19.69 b	32.02 a	51.72 a	45.63 ab	71.42 ab
Vermicompost	14.62 a	21.15 a	32.09 a	51.85 a	46.72 a	73.00 a
FYM	12.39 d	17.93 c	26.19 d	42.31 d	38.59 d	60.25 d
Vermicompost+FYM	13.93 b	20.15 b	30.79 b	49.75 b	44.73 b	69.91 b

Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2. Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Table 2. Effect of foliar spray with some stimulants on dry weight of different parts of sweet pepper at 80 and 100 days after transplanting under plastic houses conditions during 2019/2020 and 2020/2021 seasons

Treatments	Dry weight of leaves (g)		Dry weight of stem (g)		Dry weight of shoots (leaves+ stem) (g)	
	Days after transplanting					
	80	100	80	100	80	100
			2019/2020 season			
Compost tea	14.85 a	21.48 a	32.91 a	53.16 a	47.76 a	74.64 a
Vermicompost tea	14.01 b	20.25 b	31.18 b	50.37 b	45.19 b	70.62 b
Nano micronutrient	13.55 c	19.61 c	29.30 c	47.33 c	42.85 c	66.94 c
Water (control)	11.92 d	17.79 d	26.04 d	42.18 d	37.96 d	59.97 d
			2020/2021 season			
Compost tea	14.61 a	21.14 a	32.45 a	52.42 a	47.06 a	73.56 a
Vermicompost tea	14.28 a	20.66 a	31.34 b	50.63 b	45.63 b	71.29 b
Nano micronutrient	13.40 b	19.39 b	30.04 c	48.53 c	43.44 c	67.92 c
Water (control)	11.89 c	17.70 c	26.12 d	42.17 d	38.01 d	59.87 d

Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l, Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Table 3. Effect of the interaction between nitrogen fertilization sources and foliar spray with some stimulants on dry weight of different parts of sweet pepper at 80 days after transplanting under plastic houses conditions during 2019/2020 and 2020/2021 seasons

Treatments		Dry weight of leaves (g)		Dry weight of stem (g)		Dry weight of shoots (leaves+ stem) (g)	
N sources	**Stimulants FS**	**S1**	**S2**	**S1**	**S2**	**S1**	**S2**
Mineral N	**Compost tea**	15.18 ab	14.04 c-f	32.12 de	33.64 ab	47.30 b-d	47.68 bc
	Vermicompost tea	14.11d-f	14.17 a-f	30.06 fg	31.00 e	44.17 d-h	45.17 e
	Nano micronutrient	13.62 e-g	13.11 fg	28.37 hi	27.86fg	41.99 g-j	40.97 f
	Water (control)	10.51 k	11.42 i	21.79 l	22.89 i	32.30 l	34.31 h
Compost	**Compost tea**	14.34 c-e	14.19 a-f	35.42 a	33.45 a-c	49.76 ab	47.64 bc
	Vermicompost tea	13.40f-h	14.17 a-f	33.11 b-d	33.39 a-c	46.51b-e	47.56 b-d
	Nano micronutrient	13.06g-i	13.42 e-g	32.28 c-e	33.15 bc	45.34 c-g	46.57 c-e
	Water (control)	12.50 ij	12.68 gh	27.65ij	28.10 fg	40.15 i-k	40.78f
Vermicompost	**Compost tea**	15.65 a	15.30 ab	35.43 a	34.58 a	51.08 a	49.88 a
	Vermicompost tea	15.12 a-c	15.39 a	34.12 ab	33.19 bc	49.24 ab	48.58 ab
	Nano micronutrient	14.57 b-d	14.82 a-d	31.16 ef	31.79 de	45.73 c-f	46.61 c-e
	Water (control)	12.73 h-j	12.98 fg	29.83 f-h	28.83 f	42.56 f-j	41.81 f
FYM	**Compost tea**	14.12 d-f	14.50 a-e	27.83 i	28.23 fg	41.95 g-j	42.73f
	Vermicompost tea	13.00g-i	13.62 d-g	26.15 jk	27.58g	39.15 jk	41.20 f
	Nano micronutrient	12.14j	11.73 hi	25.58 k	26.26h	37.72 k	37.99 g
	Water (control)	10.43k	9.73 j	22.60 l	22.71 i	33.03l	32.44 h
Vermicompost+ FYM	**Compost tea**	14.97 a-c	15.05 a-c	33.75 bc	32.35 cd	48.72 abc	47.40 b-d
	Vermicompost tea	14.46 b-d	14.08 b-f	32.50 c-e	31.56 de	46.96 b-e	45.64de
	Nano micronutrient	14.40 b-e	13.92 c-f	29.12 g-i	31.17 de	43.52e-i	45.09e
	Water (control)	13.43f-h	12.68 gh	28.33hi	28.11 fg	41.76h-j	40.79 f

-Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2. -Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l.

Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Table 4. Effect of the interaction between nitrogen fertilization sources and foliar spray with some stimulants on dry weight of different parts of sweet pepper at 100 days after transplanting under plastic houses conditions during 2019/2020 and 2020/2021 seasons

Treatments		Dry weight of leaves (g)		Dry weight of stem (g)		Dry weight of shoots (leaves+ stem) (g)	
N sources	**Stimulants FS**	**S1**	**S2**	**S1**	**S2**	**S1**	**S2**
		21.96 ab	20.31 d-f	51.89 cd	54.34 ab	73.85cd	74.65 a-c
	Vermicompost tea	20.27 ef	20.49d-f	48.55 ef	50.07e	68.96ef	70.56 d
	Nano micronutrient	19.70fg	18.97 g-i	45.83 gh	45.00 fg	65.53 gh	63.97e
	Water (control)	17.96jk	18.97g-i	35.78 j	36.79i	53.74k	55.76f
Compost	**Compost tea**	20.75e	20.53 c-f	57.22 a	54.03 a-c	77.97 ab	74.56 a-c
	Vermicompost tea	19.39 gh	20.49d-f	53.49 bc	53.93 bc	72.88 d	74.42 a-c
	Nano micronutrient	18.90g-i	19.41 f-i	52.14 cd	53.54 bc	71.04de	72.95 b-d
	Water (control)	18.08 i-k	18.35 i	44.66h	45.40 fg	62.74 hi	63.75 e
Vermicompost	**Compost tea**	22.64 a	22.14 ab	57.23 a	55.86 a	79.87 a	78.00 a
	Vermicompost tea	21.87 a-c	22.26 a	55.12 b	53.62 bc	76.99 ab	75.88 ab
	Nano micronutrient	21.07 c-e	21.45 a-d	50.33de	51.35de	71.40 de	72.80 b-d
	Water (control)	18.41 i-k	18.77 hi	48.19f	46.57 f	66.60 fg	65.34 e
FYM	**Compost tea**	20.44ef	20.98 b-e	44.96h	45.61 fg	65.40 gh	66.59 e
	Vermicompost tea	18.81 h-j	19.70 f-h	42.23i	44.55 g	61.04 ij	64.25 e
	Nano micronutrient	17.56 k	16.98j	41.32 i	42.42 h	58.88j	59.40 f
	Water (control)	15.08 l	14.07 k	36.51 j	36.69 i	51.59 k	50.76 g
Vermicompost+ FYM	**Compost tea**	21.65 b-d	21.77 a-c	54.52 b	52.27 cd	76.17 bc	74.04 b-d
	Vermicompost tea	20.92 de	20.37 d-f	52.50 c	50.98de	73.42 cd	71.35 cd
	Nano micronutrient	20.83de	20.14 e-g	47.05 fg	50.34 e	67.88 fg	70.48 d
	Water (control)	19.42gh	18.35 i	45.77 gh	45.42 fg	65.19 gh	63.77 e

-Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2. -Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l.

Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Nitrogen, Phosphorus and Potassium Contents

Effect of nitrogen fertilization sources

The obtained results in Table 5 show that fertilizing sweet pepper with vermicompost +FYM at 0.613+2.100 kg /m^2 increased N,P and K contents in leaves and stems, followed by fertilizing with mineral nitrogen (ammonium nitrate at 0.085 kg/m^2) in the 2nd season only.

Organic manure may play a favourable role increasing nutrients availability in most soils, through the processes of chelating, biochemical processes and production of several organic acids during decomposition of organic manure as reported by **Hammad *et al*. (1990)**. In addition, The superiority of NPK content in pepper plants by vermicompost + FYM treatment may be due to that vermicompost + FYM is usually applied at much greater rates; therefore, it can have a significant cumulative effect on nutrient availability. The great rates of vermicompost +FYM also increases activity of beneficial microorganisms in soil, which help in promotion of nutrient availability by atmospheric nitrogen fixation, phosphate dissolving and potassium releasing (**Miyasaka *et al*., 1997**). All these led to increment NPK content of bell pepper plants.

The increment in NPK contents in leaves and stem of sweet pepper plants may explain the efficiency of suitable quantity of vermicompost + FYM can attract and hold nutrients and water on its surface to supply the plants with suitable amounts for longer time and this in turn improve NPK contents and this reflect on growth and dry weight of sweet pepper plants.

These results coincide with those of **Fawzy *et al.* (2012)**, **El Shimi *et al.* (2015)**, **Shahein *et al*. (2015) and Alkharpotly (2018)** indicated that under plastic house, adding chicken manure at 20 m^3/fed., with 150 or 100 Kg. mineral N/fed., to sweet pepper gave the highest concentration of N,P and K in leaves as compared to the other treatments.

Effect of foliar spray with some stimulants

Foliar spray with some with compost tea at 10 ml/l, followed by vermicompost tea at 7.5 ml/l increased N, P and K contents in leaves and stems at 100 days after transplanting in the 2nd season only (Table 5).

Such increases in chemical constituents as a result of foliar spray with compost tea and vermicompost tea may be due to its stimulants from high macronutrients which affect positively on nutrient absorption and accumulation in plant cells. The increments in NPK contents as a result of compost tea or vermicompost tea as foliar application may be attributed to their effect on sweet pepper dry weight (Table 2) as mentioned above.

These results are in accordance with those obtained by **El-Bassiony *et al.* (2007)** showed that spraying sweet pepper plants with mixture of Fe 1 g/L + Mn 1 g/L + Zn 1 g/L treatment gave the highest values N, P and K contents than unsprayed plants of sweep pepper. Also**, Abo-Sedera *et al*. (2016**) on snap bean plants found that spraying plant with compost tea gave the highest values of N, P and K contents in plant foliage than unsprayed plants.

Effect of the interaction

The interaction between fertilization with vermicompost +FYM at 0.613+2.100 kg /m^2 and foliar spray with compost tea at 10 ml/l, followed by the interaction between vermicompost at 1.225 kg /m^2 and spraying with compost tea at 10 ml/l increased,P and K contents in leaves and stems at 100 days after transplanting in the 2nd season only (Table 6).

From the foregoing results, it could be concluded that, fertilizing sweet pepper grown in plastic house conditions with vermicompost +FYM at 0.613+2.100 kg /m^2 as organic nitrogen 50% +50 % of each) and foliar spray with compost tea at 10 ml/l increased N,P and K contents in leaves and stem.

Increasing N contents in fruits of sweet may be due to the more availability of nitrogen which release from compost and compost tea by mineralization process in paddy soil that is due to conversion of organic forms of N to inorganic N as ammonium (NH_4^+) as available form of N to uptake by pepper plant (**Elekhtyar, 2007**). Also Compost and compost tea application leads to enhanced enrichment of organic nitrogen in the soil (**Gajalakshmi and Abbasi, 2008**).

Table 5. Effect of nitrogen fertilization sources and foliar spray with some stimulants on N, P and K contents in leaves and stem at 100 days after transplanting of sweet pepper under plastic houses conditions during 2020/2021 season

Treatments	Leaves			Stem		
	N	P	K	N	P	K
Effect of nitrogen fertilization sources						
Mineral nitrogen	1.83 ab	0.419 b	1.95 a	1.56 a	0.326 b	1.79 ab
Compost	1.75 b	0.409 c	1.79 b	1.42 b	0.309 d	1.70 bc
Vermicompost	1.78 b	0.419 b	1.80 b	1.44 b	0.317 c	1.73 abc
FYM	1.57 c	0.397 d	1.71 b	1.39 b	0.297 e	1.62 c
Vermicompost+FYM	1.89 a	0.429 a	2.00 a	1.58 a	0.334 a	1.85 a
Effect of foliar spray with some stimulants						
Compost tea	1.87 a	0.433 a	2.04 a	1.54 a	0.332 a	1.88 a
Vermicompost tea	1.79 ab	0.423 b	1.87 b	1.50 a	0.324 b	1.84 a
Nano micronutrient	1.75 b	0.415 c	1.80 b	1.47 ab	0.313 c	1.65 b
Water (control)	1.64 c	0.389 d	1.69 c	1.41 b	0.297 d	1.59 b

Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2

Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Table 6. Effect of the interaction between nitrogen fertilization sources and foliar spray with some stimulants on N, P and K contents (%) in leaves and stem at 100 days after transplanting of sweet pepper under plastic houses conditions during 2020/ 2021 season

Treatments		Leaves			Stems		
N sources	**Stimulants FS**	**N**	**P**	**K**	**N**	**P**	**K**
Mineral N	**Compost tea**	1.95 ab	0.438 b	2.11 ab	1.61 a	0.342 ab	1.96 ab
	Vermicompost tea	1.84 a-d	0.429 b-e	1.96 a-e	1.59 a-c	0.332 bc	1.90 a-c
	Nano micronutrient	1.82 a-f	0.422 d-f	1.92 b-f	1.54 a-d	0.328 cd	1.69 c-f
	Water (control)	1.71 d-h	0.390 jk	1.81 c-h	1.50 a-d	0.305 fg	1.63 d-g
Compost	**Compost tea**	1.88 a-d	0.423 c-f	1.99 a-d	1.49 a-e	0.327 cd	1.82 a-e
	Vermicompost tea	1.78 b-g	0.419 d-g	1.81 c-h	1.43 a-e	0.321 de	1.79 a-f
	Nano micronutrient	1.72 d-h	0.411 f-h	1.72 e-i	1.40 c-e	0.304 fg	1.61 d-g
	Water (control)	1.62 g-i	0.385 kl	1.66 g-i	1.38 de	0.286 hi	1.59 fg
Vermicompost	**Compost tea**	1.91 a-c	0.437 bc	2.02 a-c	1.50 a-d	0.334 bc	1.87 a-c
	Vermicompost tea	1.83 a-e	0.427 b-e	1.83 c-h	1.48 a-e	0.327 cd	1.83 a-d
	Nano micronutrient	1.76 c-h	0.421 d-g	1.75 d-h	1.43 a-e	0.313 ef	1.65 d-g
	Water (control)	1.65 e-h	0.394 i-k	1.63 hi	1.37 de	0.296 gh	1.60 e-g
FYM	**Compost tea**	1.64 f-i	0.415 e-h	1.93 a-e	1.48 a-e	0.311 ef	1.78 a-f
	Vermicompost tea	1.61 g-i	0.407 g-i	1.76 d-h	1.41 b-e	0.308 f	1.71 c-f
	Nano micronutrient	1.58 hi	0.394 i-k	1.69 f-i	1.39 de	0.292 h	1.58 fg
	Water (control)	1.46 i	0.375 l	1.48 i	1.30 e	0.277 i	1.43 g
Vermicompost+FYM	**Compost tea**	1.98 a	0.454 a	2.17 a	1.62 a	0.347 a	2.00 a
	Vermicompost tea	1.93 a-c	0.433 b-d	2.02 a-c	1.60 ab	0.334 bc	1.97 a
	Nano micronutrient	1.89 a-d	0.427 b-e	1.96 a-e	1.59 a-c	0.332 bc	1.74 b-f
	Water (control)	1.79 b-g	0.403 h-j	1.88 b-g	1.53 a-d	0.324 cd	1.71 c-f

-Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2.

-Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l.

Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

In this regard, **Abo-Sedera *et al*. (2016)** on snap bean plants mentioned that using mineral nitrogen at 60 kg/fad., and spraying with compost tea gave the highest values of N,P and K contents in plant foliage than using chicken manure and unsprayed plants.

Total Yield and its Components

Effect of nitrogen fertilization sources

As for early yield/plant data in Table 7 indicate that, fertilizing sweet pepper grown in plastic house with ammonium nitrate at 0.085 kg /m^2 increased early yield/plant and recorded 0.763 and 0.821 kg/plant with no significant differences with vermicompost + FYM at 0.613 + 2.100 kg /m^2 in the 2nd season.

Regarding yield and its components, such data showed that, fertilizing with vermicompost + FYM at 0.613+2.100 kg /m^2 increased average fruit weight (209 and 182 g/fruit), total yield / plant (4.018 and 3.622 kg/plant) and total yield per meter square (10.190 and 9.388) with no significant differences with vermicompost at 1.225 kg /m^2 with respect to total yield/plant and per meter square in both seasons (Table 7).

This means that fertilizing with ammonium nitrate increased early yield/plant, while vermicompost at 1.225 kg/m^2 and vermicompost + FYM at 0.613+2.100 kg /m^2 increased total yield in both seasons. As for number of fruits / plant, data show that fertilizing with vermicompost at 1.225 kg /m^2 increased number of fruits/ plant in both seasons.

Fertilizing sweet pepper with FYM at 4.200 kg/m^2 gave the lowest values of number of fruits/plant, average fruit weight and yield per plant and per meter square compared to other treatments.

The stimulative effect of vermicompost + FYM on yield / plant may be due to that vermicompost +FYM increased average fruit weight of sweet pepper (Table 5).

Vermicompost contains 2.33% N, 1.39% P and 0.99 K (see materials), in addition to these, it is, also, contains micro nutrients. It is a good source of organic matter (52.31%) which acts as a store house of all plant nutrients including trace elements might have released them gradually and steadily and this contributed towards the balanced nutrition of crop which resulted in maximum fruit yield. Also, the positive response of vermicompost in different growth parameters of sweet pepper is due to fact that it increases the microbial population and also provides the source of energy to sustain them and remain active (**Ghimire *et al*. 2013**). It increases the plant growth and yield by providing nutrients in the available form as compared to other organic manures and conventional inorganic fertilizers.

Similar results were reported by **Llaven (2008), Narkhede *et al*. (2011), Aminifard *et al*. (2012), Fawzy *et al*. (2012), Hernandez *et al*. (2014), Shahein *et al*. (2015), Adhikari *et al*. (2016) and Koshale and Banjare (2018)** all on sweet pepper. They found that fertilizing plants with organic fertilizers such as compost and vermicompost gave the best results for yield and its components than that fertilized with mineral nitrogen.

Effect of foliar spray with some stimulants

Spraying sweet pepper grown in plastic house with compost tea at 10 ml/l, significantly increased early yield/plant, number of fruits/ plant (23.42 and 24.33 fruit/plant), total yield per plant (4.120 and 3.879 kg/plant) and total yield per meter square (10.300 and 9.698 kg /m^2), whereas spraying with vermicompost tea at 7.5 ml/l increased average fruit weight (184 and 167 g/fruit) in both seasons (Table 8).

Spraying sweet pepper plants with compost tea at 10 ml/l and mixture of nano micronutrients at 0.5 g /l increased early yield / plant number of fruits/ plant, average fruit weight and total yield per plant and per meter square composed to control (spraying with water).

The increases in total yield were about 52.9 and 38.5% for compost tea, 34.7 and 26.0% for vermicompost tea and 23.2 and 11.2% for mixture of nano micronutrients over the control (water) in the 1st and 2nd seasons, respectively.

The stimulative effect of compost tea on total yield/plant may be due to that compost tea increased number of fruits/plant of sweet pepper from 15.82 and 19.77 fruits/plant for control (water) to 23.42 and 24.33 fruit/plant in the 1st and 2nd seasons, respectively (Table 8).

Table 7. Effect of nitrogen fertilization sources on total yield and its components of sweet pepper under plastic houses conditions during 2019/2020 and 2020/2021 seasons

Treatments	Early yield / plant (kg)	Yield and its components				± relative in total yield
		Number of fruits/ plant	Average fruit weight (kg)	Yield / plant (kg)	Yield/m^2	
			2019/2020 season			
Mineral nitrogen	0.763 a	17.34 d	179 b	3.105 b	7.763 b	000
Compost	0.660 c	19.46 b	165 d	3.229 b	8.073 b	04.0
Vermicompost	0.705 b	23.53 a	173 c	4.076 a	10.190 a	31.3
FYM	0.542 d	18.55 c	152 e	2.776 c	6.940 c	-10.6
Vermicompost+ FYM	0.788 a	19.15 bc	209 a	4.018 a	10.045 a	29.4
			2020/2021 season			
Mineral nitrogen	0.821 a	16.99 d	168 b	2.969 c	7.423 c	000
Compost	0.695 c	22.94 b	143 d	3.310 b	8.275 b	11.5
Vermicompost	0.763 b	24.69 a	152 c	3.755 a	9.388 a	26.5
FYM	0.629 d	22.02 b	136 e	2.999 c	7.498 c	01.0
Vermicompost+ FYM	0.760 b	19.82 c	182 a	3.622 a	9.055 a	22.0

-Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2.
Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Table 8. Effect of foliar spray with some stimulants on total yield and its components of sweet pepper under plastic houses conditions during 2019/2020 and 2020/2021 seasons

Treatments	Early yield / plant (kg)	Yield and its components				Relative increases in total yield than control
		Number of fruits/ plant	Average fruit weight (kg)	Yield / plant (kg)	Yield /m^2	
			2019/2020 season			
Compost tea	0.788 a	23.42 a	175 b	4.120 a	10.300a	52.9
Vermicompost tea	0.765 b	19.83 b	184 a	3.629 b	9.073b	34.7
Nano micronutrient	0.632 c	19.34 b	173 bc	3.320 c	8.300c	23.2
Water (control)	0.581 d	15.82 c	170 c	2.695 d	6.738d	000
			2020/2021 season			
Compost tea	0.826 a	24.33 a	160 b	3.879 a	9.698a	38.5
Vermicompost tea	0.791 b	21.14 b	167 a	3.529 b	8.823b	26.0
Nano micronutrient	0.694 c	19.92 c	160 b	3.116 c	7.790c	11.2
Water (control)	0.624 d	19.77 c	139 c	2.801 d	7.003d	000

Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l
Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

The favourable effect of compost tea on total yield might be attributed to positive effects to compost tea on the crops because contains many macro and micro nutrients in available form, natural hormones and the highest number of microorganisms that be available for plant and so reflect on plant growth and its composition (**Meshref *et al*., 2010**) that led to improve yield. Moreover, the highest yield was recorded with compost tea. This was probably due to increase in the number of fruits /plant, average fruit weight, yield/plant which might contribute to the increase in production.

These results agreed with **Zaccardelli *et al*. (2018)** indicated that spraying pepper plants with compost tea at 5 ml/l under green house significantly increased total yield by 21.9% and 16.3%. in the 1st and 2nd seasons, respectively than unsprayed plants. Also, they added that, the increment of the yields was related to an increase of the number of fruits *per* plant, whereas the weight of the single fruit was not affected by treatment. Also, **Ahmed and Abdelkader (2020)** showed that, fruit length, fruit diameter and average fruit weight, number of fruits/ plant, fruit yield/plant and total yield/feddan of chilli were the highest with spraying chili plants with Nano micronutrients at 0.25 or 0.50 g/l as compared to control treatment. however, **Jandaghi *et al*. (2020)** tested the effect of some nitrogen sources on cucumber, *i.e.*, control (without any fertilizer), control with chemical fertilizer (20-20-20), vermicompost in two levels (20 and 30%), and chicken manure tea (25, 50, and 75%). They showed that increasing the amount of chicken manure tea (up to 50%) significantly increased days until flowering, yield (40, 65, and 90 days after culturing), marketable fruit ratio to second degree fruit, and total fruit weight of cucumber by enhancement in content of chicken manure tea (75%) all traits showed the same result as treatment with chemical fertilizer.

Effect of the interaction

As for early yield/plant, the interaction between vermicompost +FYM at 0.613+2.100 kg/m^2 and foliar spray with vermicompost tea at 7.5 ml/l significantly increased early yield/plant without significant differences with vermicompost + FYM at 0.613+2.100 kg/m^2 and foliar spray with compost tea at 10 ml/l in the 1st season and with the interaction between ammonium nitrate at 0.085 kg /m^2 and spraying with compost tea at 10 ml/l in the 2nd season (Tables 9 and 10). The interaction between vermicompost at 1.225 kg / m^2 and spraying with compost tea at 10 ml/ gave the highest values of number of fruits/plant (26.48 in the 1st season) and total yield per plant (4.941 and 4.239 kg/plant and 12.353 and 10.598 kg per m^2) in both seasons (Tables 9 and 10). Whereas, the interaction between vermicompost + FYM at 0.613+2.100 kg/m^2 and foliar spray with vermicompost tea at 7.5 ml/l gave the highest values of average fruit weight (218 and 203 g/ fruit) in both seasons.

The stimulative effect on the interaction between vermicompost +FYM and compost tea on total yield, may be due to that vermicompost +FYM and compost tea increased N,P and K contents by sweet pepper organs (Table 6) which resulted in increased plant growth characters.

From the foregoing results, it could be concluded that, fertilization of sweet pepper in plastic house with vermicompost + FYM at 0.613 + 2.100 kg/m^2 as organic nitrogen (50% + 50% of each) and spraying with compost tea at 10 ml/l increased average fruit weight, whereas fertilization with vermicompost at 1.252 kg /m^2 as organic nitrogen (100%) and spraying with compost tea at 10 ml/l increased number of fruits/plant and total yield per plant and per meter square.

It may be due to the direct effect of vermicompost application and foliar spray with liquid manure on plant growth, which provides a source of plant macro and micronutrients. Although some of these nutrients are present in inorganic forms and are readily available to plants, most are released gradually through mineralization of the organic matter, thus comprising a gradual-release fertilizer that contributes the plant with a dynamic and stable source of nutrients (**Hameedi *et al*., 2018**).

These results are harmony with those reported by **Narkhede *et al.* (2011)** showed that fertilizing with vermicompost at 20% gave the highest values of fruit yield of pepper as compared to using urea as chemical fertilizer. Also, **Hameedi *et al*. (2018)** indicated that application of vermicompost at 7 t/ha along with Jeevamrut (liquid manure at 3% as foliar spray)

Table (9). Effect of the interaction between nitrogen fertilization sources and foliar spray with some stimulants on total yield and its components of sweet pepper under plastic houses conditions during 2019/2020 season.

Treatments		Early yield / plant (kg)	Yield and its components				Relative ± in total yield than control
N sources	Stimulants FS		Number of fruits/ plant	Average fruit weight (kg)	Yield / plant (kg)	Yield /m^2	
Mineral N	**Compost tea**	0.840 b	22.51 c	174 hi	3.920 c	9.800c	55.1
	Vermicompost tea	0.824 b	15.64g-i	200 cd	3.135 de	7.838de	24.1
	Nano micronutrient	0.700 ef	15.43 hi	184 fg	2.839 d-g	7.098d-g	12.3
	Water (control)	0.689 e-g	15.78 gh	160 j	2.527 f-h	6.318f-h	000
Compost	**Compost tea**	0.792 bc	23.16 c	175 g-i	4.073 c	10.183c	61.2
	Vermicompost tea	0.642 g-j	20.40de	145 k	2.952d-g	7.380d-g	16.8
	Nano micronutrient	0.612ij	18.10 f	176 gh	3.189 d	7.973d	26.2
	Water (control)	0.594 j	16.20 gh	167ij	2.705e-h	6.763e-h	07.0
Vermicompost	**Compost tea**	0.766 cd	26.48 a	187 ef	4.941 a	12.353a	95.5
	Vermicompost tea	0.733 de	25.61 ab	166 ij	4.259 bc	10.648bc	68.5
	Nano micronutrient	0.693e-g	25.27 b	163j	4.116 bc	10.290bc	62.9
	Water (control)	0.630h-j	16.76 g	178 gh	2.990 de	7.475de	18.3
FYM	**Compost tea**	0.623h-j	22.37 c	132 l	2.957 d-f	7.393d-f	17.0
	Vermicompost tea	0.654 f-i	16.73g	195 de	3.260 d	8.150d	29.0
	Nano micronutrient	0.489 k	19.20 ef	132 l	2.526gh	6.315gh	00.0
	Water (control)	0.402 l	15.90 gh	149 k	2.363 h	5.908h	-6.5
Vermicompost+FYM	**Compost tea**	0.921 a	22.58 c	209 bc	4.711 a	11.778a	86.4
	Vermicompost tea	0.972 a	20.80 d	218 a	4.540 ab	11.350ab	79.7
	Nano micronutrient	0.668f-h	18.73 f	210 ab	3.932 c	9.830c	5.6
	Water (control)	0.591 j	14.50 i	199 d	2.890 d-g	7.225d-g	14.4

-Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2. -Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l.

Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

Table 10. Effect of the interaction between nitrogen fertilization sources and foliar spray with some stimulants on total yield and its components of sweet pepper under plastic houses conditions during 2020/2021 season

Treatments		Early yield / plant (kg)	Yield and its components				Relative ± in total yield than control
N sources	Stimulants FS		Number of fruits/ plant	Average fruit weight (kg)	Yield / plant (kg)	Yield /m^2	
Mineral N	**Compost tea**	0.886 ab	19.99 i	185 bc	3.694 b	9.235b	39.5
	Vermicompost tea	0.896 a	17.51 j	162 de	2.839 fg	7.098fg	07.2
	Nano micronutrient	0.766 d	15.48 kl	174 cd	2.696 g	6.740g	01.8
	Water (control)	0.736 de	15.00 l	154 e-g	2.648 g	6.620g	000
Compost	**Compost tea**	0.856 a-c	27.00 a	151 e-g	4.076 a	10.190a	53.9
	Vermicompost tea	0.676 f	22.38 d-f	144 g-i	3.219 c-e	8.048c-e	21.6
	Nano micronutrient	0.684 ef	22.02 e-g	148 f-h	3.259 cd	8.148cd	23.1
	Water (control)	0.565 h	20.39 g-i	132 i-k	2.689 g	6.723g	01.5
Vermicompost	**Compost tea**	0.840 bc	26.52 ab	160 ef	4.239 a	10.598a	60.1
	Vermicompost tea	0.833 c	23.83 cd	176 c	4.203 a	10.508a	58.7
	Nano micronutrient	0.736 de	23.40 c-e	150 e-h	3.504 bc	8.760bc	32.3
	Water (control)	0.646fg	25.01 bc	123 k	3.076 d-f	7.690d-f	16.2
FYM	**Compost tea**	0.662 f	24.18 c	130 jk	3.154 d-f	7.885d-f	19.1
	Vermicompost tea	0.685 ef	21.73 e-h	150 e-h	3.261 cd	8.153cd	23.1
	Nano micronutrient	0.607 gh	21.12 f-i	137 h-j	2.891 e-g	7.228e-g	09.2
	Water (control)	0.565 h	21.07 f-i	128 jk	2.692 g	6.730g	01.7
Vermicompost+FYM	**Compost tea**	0.889 ab	24.00cd	176 c	4.233 a	10.583a	59.9
	Vermicompost tea	0.866 a-c	20.29 hi	203 a	4.123 a	10.308a	55.7
	Nano micronutrient	0.679 f	16.87 jk	192 ab	3.234 cd	8.085cd	22.1
	Water (control)	0.609 gh	18.13j	160 ef	2.900e-g	7.250e-g	09.5

-Mineral nitrogen as ammonium nitrate = 0.085 kg /m^2, compost at 3.617 kg/m^2, vermicompost at 1.225 kg /m^2, FYM at 4.20 kg /m^2 and FYM at 2.100 + vermicompost at 0.613 kg /m^2.

-Compost tea at 10 ml/l, Vermicompost tea at 7.5 ml/l and mixture of nano micronutrients (Magro Nano Mix) at 0.5 g/l.

Values having the same alphabetical letter(s) did not significantly differ at the 0.05 level of significance, according to Duncan's multiple range test.

recorded the highest values of yield attributes (number of fruits per plant, average fruit weight, fruit yield /plot) and fruit yield/ha., of pepper and recorded (82.4) per cent increase in yield over control along.

In conclusion, this work showed that satisfactory sweet pepper yield and quality, could be obtained in organic production systems under plastic house conditions using compost as a recommended rate of nitrogen and spraying with compost tea to reduce environment pollution caused by application of mineral fertilizers and sustain soil fertility.

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إستجابة نمو وإنتاجية الفلفل الحلو لمصادر التسميد النيتروجينى والرش الورقى ببعض محفزات النمو تحت ظروف الصوب البلاستيكية

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أجرى هذا البحث خلال شتاء 2020/2019 ، 2021/2020 فى صوب بلاستيكية خاصة غير مدفأه بكوم حلين – مركز منيا القمح بمحافظة الشرقية ، مصر لدراسة تأثير مصادر التسميد النيتروجينى المختلفة والرش ببعض المواد المنشطة على نمو ومحصول الفلفل الحلو صنف لاريكا أر ذ النامى فى ارض طينية تحت نظام الرى بالتنقيط. اظهرت النتائج الى أن التفاعل بين تسميد نباتات الفلفل الحلو بالفيرمى كومبست بمعدل 1.225 كجم/م^2 (نيتروجين عضوى 100%) والرش بشاى الكومبست معدل 10 ملليتر/لتر الى زيادة الوزن الجاف للأوراق/ نبات ، الوزن الجاف للسيقان/ النبات، الوزن الجاف لعرش للنبات وذلك بعد 80 ، 100 يوم من الشتل فى كلا الموسمين ، عدد الثمار على النبات ومحصول النبات ، يليه معاملة التفاعل بين التسميد بالفيرمى كومبست والرش بشاى الفيرمى الكومبست معدل 7.5 ملليتر / لتر. عموما سجلت معاملة التفاعل بين تسميد النباتات بالفيرمى كومبست + السماد البلدى بمعدل 0.613 + 2.100 كجم/م^2 والرش بشاى الكومبست معدل 10 ملليتر/لتر الى زيادة المحتوى من النيتروجين والفوسفور والبوتاسيوم بواسطة الأوراق والسيقان و متوسط وزن الثمرة.

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