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BIO. ORGANIC AND CHEMICAL FERTILIZER AS AFFECTED THE PRODUCTIVITY OF EGGPLANT (*Solanum melogena L.*).

Fatma A. Rizk
Hort. Dept., National Research Centre. Dokki, Cairo,Egypt.

ABSTRACT

Two field experiments were carried out during the two successive seasons of 1999 and 2000 at the Experimental Station of National Research Centre, at Shalakan Kalubia Governorate) to study the effect of different sources of organic manure (cattle and chicken manures) and chemical fertilizers (NPK) with or without biofertilizer (microbein) on growth, yield of eggplant and its some physical and chemical properties. The important obtained data are following:

1- Application of microbein biofertilizer resulted the highest values of growth characters, yield and its components, TSS and the contents of nutritional elements compared with the control treatment.
2- Addition of the chemical fertilizer (NPK) obtained the best vegetative growth characters, the heaviest yield (early and total as ton/fed.), the highest values of TSS, total protein as well as the concentration of N, P, K, Fe, Mn, Zn and Cu.
3- The best growth characters, heaviest yield (early and total as ton/fed.), average weight of fruits as well as the highest values of TSS, protein and the concentration of N, P, K, Fe, Mn, Zn and Cu all of them were resulted from that plants received with microbein biofertilizer and chemical fertilizer (NPK).

INTRODUCTION

Eggplant (*Solanum melogena, L*.) is generally enlisted as classical commodity for both local consumption and exportation. As might be expected with crops of such promising potentialities efforts to improve its production should be carried out. Increasing the productivity as well as the cultivated area, led to increase the used of chemical fertilizers, which increased production cost as well as environmental pllution. Biological N_2 – fixation may give part in decreasing these effects. Many reports indicated that inoculation of seed or seedlings, of various $C_3$and C_4 plants, with associative N_2 –fixing bacteria led to change in plant growth and yield (Eid, 1982 and Pohlaman and Mc coll, 1982; Fatma and Shafeek, 2000 and Abdallah *et al*., 2001). Galal, 1991 suggested that combination of chemical fertilizers (urea or ammonium sulphate) with Azospirillum microorganisms produced more N uptake than those induced with either chemical fertilizers alone or sole inoculation. The results of Esaad *et al*., indicated that biofertilization could compensate 30-40% of the recommended nitrogen.

Abdel-Wahab *et al*. 1999 reported that applying organic manure and biofertilizer isstead of chemical fertilizer may improve soybean production as well as protects the enviroment from chemical pollution and its harmful effect on human and animal health.

Organic manures contain higher levels of the elemintal requirments for plant growth. Moerover they play an important role for improving soil

physical properties (Bhandari *et al*., 1989). In addition fertilization with biofertilizer saved a great amount of chemical fertilizer (Bahr, 1997and Rizk,2002), which in turn protects the enivronment from chemical pollution and its harmfull effect on human and animal health.

Therefore, the present work aimed to maximize the benefits of organic manure used and biofertilizer application for reducing chemical fertilizers application.

MATERIALS AND METHODS

Two field experiments were carried out during the two successive growth seasons of 1999 and 2000 at the Experimental Station of the National Research Centre, Shalakan, Kalubia Governorat, to study the effect of different sources of organic manure (cattle and chicken manures) and chemical fertilizers with or without biofertilizer (microbein) on the productivity of eggplant. The cattle, chicken and N.P.K. are added at rate of 100 Nitrogen units per feddan. While the biofertilizer (microbein) was added at rate of 2 packing/fed. as the recommended rate. The chemical characteristics of the experimental soil are presented in Table (1), while chemical analysis of organic manure is given in Table (2).

Table 1: Chemical analysis of the experimental soil 1999 and 2000 seasons.

Chemical analysis	1999	2000
Available K (mg/100g soil)	0.61	0.58
Available P (mg/100g soil)	5.72	4.82
Total nitrogen (mg/100g soil)	128.04	151.82
CL (meq/L.)	1.82	1.65
Co_3 (meq/L.)	4.34	5.13
Na_2 Co_3 (meq/L.)	3.65	3.82
Ca Co_3 (meq/L.)	1.76	1.65
Organic matter (%)	1.82	1.86
So_4 (ppm)	76.03	95.41
Ec (mmhos/cm/25°c)	2.48	2.36
pH	7.52	7.70

Each experiment consisted of 6 treatments, which were the combination of three sources of fertilizers (cattle, chicken manure and NPK compound) and the two treatments of bio-fertilizers, i.e. with and without (microbein). The factorial experiment in split-plot desigen with three replication was made in use, where with or without biofertilizers (microbein) were allocted in the main plots and sources of fertilizers (cattle, chicken and NPK) were distributed randomized within the sub-mean plots. Each experimental sub-plot consisted of 4 ridges,5 m in length and 80 cm in width (plot area 16 m^2). Whereas, organic manures(cattle and chicken)applied to the soil during preparing it for planting, but the NPK fertilizer was added at two times, i.e one half before seedling plantation and the second one 45 days

late. While the microbein was added during the seedling time. Nitrogen, Phosphorus and Potassium fertilizers were added as ammonium sulphate (20.5%N), calcium super phosphate (15.5% P_2O_5) and potassium sulphate (48% K_2O) respectively. The eggplant seedlings were sown on one side of the ridge 20 cm apart on March 20 and 26 in the two seasons, 1999 and 2000, respectively. The normal cultural practices commonly used in growing and irrigation of eggplant was followed. Two months after tranplanting, foliage samples were collected from every experimental plot and the following vegetative growth parameters were recorded: plant length (cm), number of shoots and leaves per plant, total fresh and dry weights (g) of eggplant and its different organs, i.e. shoots and leaves.

Table 2: The chemical analysis of the used cattle and chicken manures.

Character	Cattle	Chicken
pH	7.5	6.5
Ec (mmhos)	14.1	5.7
Organic carbon %	7.9	32
Organic matter %	6.5	63.2
Total nitrogen %	0.42	2.95
C/N ratio	1:19	1:11
Total phosphorous %	0.41	1.14
Total potassium %	0.85	1.8
Iron mg/kg	650	168
Manganese mg/kg	135	241
Copper mg/kg	11	92
Zinc mg/kg	105	110

Eggplant fruits were harvested weekly and the average fruit number per plant, total fruit yield as well as early yield (first 3 pickings) were counted as ton fed. Sampls of fruits at harvesting time (from the fourth picking) were taken to determine the following physical quality of eggplant fruit, i.e. length, diameter, size, average weight. In tissues of fruits the values of total soluble solids (TSS) were determined using hand refractometer. Nitrogen, Phosphorus and Potassium contents in fruits were analyzed according to the methods of Pregl (1945), Troug and Mayer (1939) and Brown and Lilleland (1946), respectively. However, Fe, Mn, Zn and cu contents were determined using flame ionization atomic absorption, spectrometer model 1100 B of Perkin Elemer and according to the method of Chapman and Pratt (1978). The protein percentage in dry seeds was accounted by multiplying nitrogen content by 6.25.

All data values were subjected to the analysis of variance to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

A: Growth characters:

1-Effect of bio- N- fertilizer:

Treating eggplant seedling before transplanting by the bio- N-fertilizer as dipping in microbein solution at rate of 2Kg microbein in 100 Litre water /fed. caused a promtion effect in vegetative growth of plant compared with no microbein treating, whereas, in both experiments, the heighest eggplants which produced the highest number, fresh and dry weights of leaves and shoots (Table, 3). Moreover, the statistical analysis of the obtained data reveals that, the differences within the two treatments of microbein addition were statistical significant at 5% levels. The trends of the results were similar nearly in both seasons.

It could be concluded that, significant effect of biofertilizers on plant growth may be due to the effect of different strains group such as nitrogen fixers, nutrient mobilizing microorganisms, which help in availablity of metals and increased the level of extracted NPK (macro nutrient) or (Fe, Zn, Mn (micro nutrients). Many other investigators such as El-Kramany *et al*. 2000; Fatma and Shafeek, 2000 and Abdallah *et al*. 2001 obtained data supported the obtained results.

2-Effect of Nitrogen source:

Table 3 shows clearly that, under the condition of these experiment, addition of nitrogen fertilizer as a chemical source (NPK) was more favorable for plant growth of eggplant compared with addition of nitrogen as an organic source (cattle and/or chicken).,where the best values of plant length, number, fresh and dry weight of leaves and shoots. Also the obtained data reveals that, plants received chicken manure recorded values of plant growth less than NPK treatment but more than that plant supplied cattle manure at the same rate of nitrogen units. It could be stated that, the chemical nitrogen fertilizer for eggplant was more associated with plant growth than organic fertilization. This superiority was attributed to the solubility and availability of nitrogen in the form of chemical for plant growth. However, the poorest eggplant growth which were correlated with addition of cattle manure, it could be own to its less content of N, P and K contents if compared with the chicken manure. The obtained values of plant growth were varied statistically as influenced by the different nitrogen sources. These findings were true in experiments of 1999 and 2000 with some low exception. Fatma, *et al*. 1997;Sawan and Rizk, 1998; Yuanxin *et al*. 1998 and Singh and Kohli, 1999;obtaied similar results.

3-Effect of the interaction:

The results of Table 3 clearly indicated that effect of the interaction between microbein treatments and nitrogen sources fertilizers on the values of plant growth were significantly at 5% level. These were true in both seasons for all growth characters except dry weight of whole plant and its leaves in 1999 season as well as fresh weight of whole pant in 2000 season.

3

Generally, the best plant growth of eggplant criterias were associated with that plants received microbein and fertilized by NPK as a chemical nitrogen fertilizer. These results followed the same order of change in two experimental seasons.

B: Yield and its some physical properties:

1- Effect of bio- N- fertilizer:

Data of Table 4 and Fig. 1 clearly demonstrated that the dipping eggplant seedlings in microbein as bio- fertilizer for 5 minutes before planting cased an increase in total and early fruit yield as well as average number of fruits/plant eggplant yield compared with that seedling no treated by microbein. The differences within those two treatments were enough to reach the 5% level of significant. These results held good in the two experimental seasons. The significant effect of microbein on eggplant yield may be attributed to its effect on plant growth, consequently increased the accumulated carbohydrates as well as its effect on the metabolism and photosynthetic processes. Also microbein caused an enhancement in the microorganism of soil, which affected the solubility and availability of minerals. Tofino, *et al*. 1998; Fatma and Shafeek, 2000 and Abdallah, *et al*. 2001, obtained similar results.

Some physical properties of eggplant fruit significantly affected by the bio-fertilizer. Whereas, the values of fruit dimension, size and average fruit weight recorded superiority with treated seedling of eggplant by microbein. These results held good in seasons of 1999 and 2000. Many investigators had a similar trend of the obtained data such as (Bahr, 1997; Livosa, *et al.,* 1997; Fatma and Shafeek, 2000 and Abdallah, *et al.,* 2001).

2-Effect of Nitrogen sources:

The effect of some nitrogen fertilizer sources i.e. organic (chicken and cattle) and chemical (NPK) on eggplant yield and its some physical properties are shown Table 4 and Fig. 2 for the experimental seasons of 1999 and 2000. It is shown from the obtained results that, the heaviest tonnage (13.755 and 14.539 tons respectively, for 1 st and 2 nd seasons) of yield were harvested with that plants received fertilizer nitrogen as a chemical source. Whereas, that plants supplied by chicken manure recorded of 12.291 and 13.444 ton/fed. for 1 st and 2 nd seasons respectively. It means that, the lightest fruit yield was recorded with the addition of cattle manure. But the statistical analysis of the recorded data reveals that, the variations with different nitrogen fertilizer treatment were slowly significant at 5% levels. These findings were true for both seasons.

Regarding the early eggplant yield (the first three harvesting) as well as average number of fruits/plant followed the same pattern of change like that previous mentioned before for the two seasons.

It could be concluded that, the heaviest total and early eggplant yield were associated with those plants grown under the addition of chemical nitrogen fertilizer source. This superiority can attribute to the availability and solubility of nitrogen in the chemical form, which supplied plants by its need requirements particularly in the early stages.

Table (4): Effect of bio, organic and chemical fertilizer on yield components of eggplant during 1999 and 2000 seasons.

Characters / Treatments		1999						
		Fruits			Yield (ton/fed.)			
		Length	Diameter	Size	No./plant	Average wt. (gm)	Early	Total
Without microbein	Cattle	11.21	3.17	90.59	33.47	39.51	2.906	10.164
	Chicken	11.8	3.01	91.96	34.39	39.14	3.361	9.992
	NPK	13.62	3.18	87.91	40.03	44.00	4.081	11.780
Mean		12.24	3.12	90.15	35.96	40.88	3.449	10.646
With microbein	Cattle	12.88	3.30	97.99	36.82	46.73	3.620	13.078
	Chicken	13.28	3.12	93.16	40.11	52.87	4.638	14.078
	NPK	14.06	3.81	103.61	52.21	54.62	5.678	15.730
Mean		13.40	3.41	98.25	43.05	51.40	4.645	14.466
Average	Cattle	12.04	3.23	94.29	35.14	43.116	3.263	11.621
	Chicken	12.56	3.07	92.56	37.25	46.004	3.999	12.291
	NPK	13.84	3.49	95.76	46.12	49.314	4.879	13.755
LSD at 5%	Microbein	0.41	0.28	2.32	2.99	5.03	0.67	1.36
	Fertilizers	0.34	0.22	2.35	3.44	2.51	0.33	0.62
	Interaction	0.48	0.30	3.32	4.86	3.54	0.47	0.88
2000								
Without microbein	Cattle	12.71	2.61	94.67	18.62	46.56	3.029	11.682
	Chicken	12.72	3.00	97.89	21.08	49.60	3.352	12.289
	NPK	12.98	3.06	99.67	24.11	54.19	3.427	14.100
Mean		12.80	2.89	97.41	21.27	50.12	3.269	12.690
With microbein	Cattle	14.06	3.13	100.89	24.19	60.50	4.122	13.633
	Chicken	14.77	3.27	96.11	23.96	60.46	4.680	14.600
	NPK	17.00	3.17	104.89	26.30	66.58	5.964	14.978
Mean		15.27	3.19	100.63	24.82	65.51	4.922	14.404
Average	Cattle	13.38	2.87	97.89	20.41	53.528	3.576	12.658
	Chicken	13.74	3.13	96.78	23.73	55.028	4.016	13.444
	NPK	14.99	3.11	102.28	24.61	60.383	4.696	14.539
LSD at 5%	Microbein	1.99	0.11	2.76	2.04	9.36	0.014	0.863
	Fertilizers	1.04	0.16	3.26	1.38	1.10	0.185	0.256
	Interaction	1.47	0.23	4.61	1.96	1.56	0.261	0.363

fig1

fig2

In spite the heaviest yield of NPK application if compared with that of organic one but it contained some accumulated chemicals, for consequently its properties unsuitable exportation.

The present findings are in a harmony with Patil, *et al*. 1998; Rumpel, *et al*. 1998; Bhardwaz, *et al*. 2000 and Ribeiro, *et al*. 2000 and Rizk, 2002.

Concerning the physical properties of eggplant fruits (length, diameter, size and average fruit weight) all of them, the highest values were corrected with NPK fertilization. These findings were similar for all parameters of 1 st and 2 nd seasons except that of fruit diameter in 2 nd season.

These results are in good accordance with that of Fatma and Abdallah, 1998; Baskar and Saravanan, 1998; Sawan and Rizk, 1998 and Siviers, *et al*. 2001.

3-Effect of the interaction:

The interaction between nitrogen sources and bio- nitrogen fertilizer for eggplant fertilization had a significant effect on the total and early fruits yield as well as average number of fruit /plant in both seasons of 1999 and 2000 (Table 4). Generally, the heaviest total early as well as average number of fruits /plant were associated with that plants received nitrogen as a chemical source and its seedling treated with microbein before transplanting. These were true in both seasons. Moreover, the behavior of values of length, diameter, size and average weight of fruit followed the same pattern of change, which above mentioned.

C: Some chemical properties of fruits yield:

1-Effect of bio- N- fertilizer:

The presented data of Table 5 shows the response of some macro (N, P and K) and micro (Fe, Mn, Zn and Cu) elements as well as the values of TSS and protein in tissues of eggplant fruits for seasons 1999 and 2000. Whereas, using microbein as bio- nitrogen fertilizer resulted in a significant enhancement in the above parameters in both seasons. The obtained increments in nutritional values in eggplant fruits might be attributed to the promotion effect of microbein on the plant growth, which did an enhancement to absorb more elements from the soil solution, consequently their values increased in plant tissues such as eggplant fruit.

The experiments, which carried out by many workers such as Wange, 1997; Gomez and Munoz, 1998; Fatma and Shafeek, 2000 and Abdallah *et al*. 2001and Ali *et al*. 2001 are supported the obtained findings.

2- Effect of Nitrogen fertilizer sources:

Eggplants supplied by NPK (chemical nitrogen fertilizers) as compared with some organic nitrogen fertilizer (chicken and cattle), all of the three sources added by the same quantity of nitrogen units. The response of protein and some nutritional elements as well as TSS of fruits are presented in Table 5. It indicated that, plants, which supplied by nitrogen in the chemical form, gave the highest content of N and K (two seasons) and P (1 st season) as well as the highest values of protein (two seasons) and TSS (1 st season).

On the contrary addition chicken manure resulted in the highest values of Fe, Mn, Zn and Cu (two seasons), P and T.S.S. (2 nd season).

It could be conclude that, the higher values of some macro-elements in fruit tissues were associated with addition NPK, but the microelements such as Fe, Mn, Zn and Cu were related to the addition of chicken manure. Generally, it could abstract that; the chemical and chicken fertilizer gained the highest values of nutritional values. This superiority may own to the more vigor of plant growth, i. e. a strong rooting system consequently the uptake of the elements was increased. Moreover, the chemical analysis of chicken manure indicated that it contains more content of the elements than cattle manure, by this means it could explained the low values of the nutritional values which obtained by planting eggplant under the condition of cattle manure addition.

The obtained results are in good agreement with those obtained by Wankhade, *et al*. 1996; Abd-el-Aty, 1997; Abdel-Mouty, *et al*. 2000; Ali *et al*. 2001.

3-Effect of the interactions:

The response of some nutritional values in fruits of eggplant tissues as influenced by the interaction between addition of microbein and some other sources of nitrogen are presented in Table 5.

Generally treating seedling of plants by microbein resulted in the highest values of protein, N, P and K when its plants fertilized by NPK as a chemical fertilizer. But with chicken manure addition, the content of Fe, Mn and Cu were the highest. These findings were true in both seasons. The statistical analysis of the obtained data reveals that, the differences within different interaction treatments were enough to be significant at 5% level. These were true in both seasons for different parameters with exception of the content of phosphorus (two seasons) and Cu (2 nd season).

REFERENCES

Abdallah A. M.; Fatma A. Rizk and S. M. Adam (2001). The productivity of pepper plants as influenced by some biofertilizer treatments under plastic house conditions. Bull. Fac. Agric., Cairo Univ., 52:625-640.

Abdel-Mouty, M.M.; A.H. Ali and Fatma A. Rizk (2000). Potato yield as affected by the interaction between bio-and organic fertilizers. Egypt J. Appl. Sci.; 16(6):267-286.

Abdel- Aty, S.(1997).Influence of some organic fertilizers on the growth and yield of pepper plants (*Capsicum annum L*.) cultivated under plastic houses. M. Sc. Thesis, Fac. Agric. Ain Shams Univ., Cairo, Egypt.

Abdel-Wahab, A.M.;G.M.Yakout; E.A. Ali and M.H. Greish (1999). Response of soybean crop to phosphatic fertilization, organic manuring and biofertilization under reclaimed sandy soil conditions. Egypt. J. Appi. Sci., 14(8): 125-138.

Ali, A.H.; M.M. Abdel-Mouty and A.M. Shaheen (2001).Effect of bio-nitrogen, organic and in-organic fertilizer, on the productivity of garlic (*Allium sativum L*.) plants. Egypt, J. Appl. Sci., 16(3): 173-188.

Bahr, A. B. (1997). Response of chickpea crop to some fertilization treatments. Ph. D. Thesis Fac. Agric. Suez Canal Univ. Egypt.

Baskar,M. and A.Saravanan (1998). Effect of coirpith containing potting medium and methods of fertilizer application on yield and guality of tomato. South Indian Horticulture, 46(3-6):200-202.

Bhandari, A.L.; K. N. Sharma; M.L. Kapur and D. S. Rana (1989). Supplementation of N through green manuring for maize growing. J. of the Indian Soc. of soil Soc.,37(3):483-486.

Bhardwaj, M.L.; R. Harender; B. L. Koul and H. Raj (2000). Yield response and economics of organic sources of nutrients as substitute to inorganic sources in tomato (*Lycopersicon esculentum*), okra (*Hibiscus rsculentus*), cabbage (*Brassica oleracea var capitata*) and cauliflower (*Brassica oleracea var botrytis*). Indian J. of Agri., Scie., 70(10): 653-656.

Brown, J.D and O. Lilleland (1946). Rapid determination of potassium and sodium in plant material and soil extracts by flame photometry. Proc. Amer. Soc. Hort. Sci., 38: 341 – 364.

Champman, H.D. and P.F. Pratt (1978). Methods of analysis for soils, plants and waters. Univ. California, Div. Agric. Sci. priced pub. 4034.

Eid, M.A.(1982). Association of a symbiotic N_2 –fixing bacteria with roots of some major crops. Ph. D. Thesis Fac. Agric. Cairo Univ. Egypt.

El-Kramany,M.F.; M.K.A. Ahmed; A.A. Bahr and M.O. Kabesh (2000). Utilization of bio-fertilizers in field crop production. Egypt, J. Appl. Sci., 15(11):135-155.

Esaad, H.b.; R.A.Mitkees;M.A.M. Eid; M.H. Iskandar; I. M. M. Sadek; A.M. Abu-Warda and A.A. Hamada(1997). Effect of some Egyptian biofertilizers on wheat plants (*Triticum aestvum L*.). Egypt J. Appl. Sci., 12(1):57-67.

Fatma A. Rizk, A. M. Abdallah and A. M. Shaheen (1997). Effect of nitrogen forms, and levels on growth and yield of eggplant (*Solanum melongena L*.). Egypt. J. Hort., 24(2): 239-259.

Fatma A. Rizk and M.R. Shafeek (2000). Response of growth and yield of *Vicia faba* plants to foliar and bio-fertilizers. Egypt, J. Appl. Sci.;15(12):652-670.

Galal, Y.G.M. (1991). Evaluation of some fertilizers for increasing nitrogen efficiency under Egyptian conditions. Ph.D. Thesis, Shams Univ. Cairo, Egypt.

Gomez, K.A. and A.A. Gomez (1984). Statistical procedures for Agriculture Research. Second ed. Willey Inter Science Publ., 357 – 423.

Gomez, R. and H.A. Munoz (1998). Biofertilization of garlic (*Allium sativum L*.) on a compacted red ferralitic soil. Cultivos-Tropicales. 19; 2:9-13.(CAB Abst. 1998/08-1999/04).

Livosa N. Yu;E. Koval-Chuk ; Z Lorkavich ; M. S. Galan; E. Koublczuk and Z. Lorkeiwicz (1997). Efficiency of competitiveness of rhizobial strains of

broad bean under different soil climatic condition. Mikrobiologich Rhizurnal.

Patil M.P.; N.C.Hulamani; S.I. Athani and M.G. Patil (1998). Response of new tomato geotype Megha to integrated nutrient management. Advance in Agric. Res. In India, 9: 39-42.

Pohlaman, A.A. and J.G. Mc Coll (1982). Nitrogen fixation in the rhizosphere of barley. Plant and Soil, 69:341-352.

Pregl, F.(1945). "Guntitative organic micro-analysis "1st Ed. J. and A. Churdill, ltd. London.

Ribeiro, L. G.; J. C. Lopes; F. S. Mastms and S.S. Ramalho (2000). Effect of organic fertilizer application on sweet pepper yield. Adubacas organica na producao de pimentao. Horticultural Brasileia, 18 (2): 134-137 (C.F. Hort. Abst., 64,2023,2001).

Rizk, F. A. (2002). Effect of organic manure with or without inorganic fertilizers on the productivity of okra plant (*Hibscus esculentus, L*.). Egypt. J. Appl. Sci., 17(8): 364-383.

Rumpel, J.; H.Jakubcz (Ed.); B.Lata (Ed);A. Sadowwski(Ed.) and P.Whiteheead (1998). Effect of long term organic and mineral fertilization on soil properties and development of tomato, carrot and onion. Ecological aspects of nutrition and alternatives for herbicides in Hort., Interatioal seminar, Warsaw, Poland, 10(15):63-64.

Sawan, O.M. and A.F. Rizk (1998). The productivity of eggplant (*Solanum melongena L*.) as affected by the sulphur element and NPK mixture. Egypt. J. Hot., 25(1): 1-16.

Singh, R. and U. K. Kohli (1999). Effect of NPK regimes on growth and developmental characters of tomato hybrids. of Hill Res.,12(1):63-66.

Siviero P.;V. Marasi; G. Boni and L. Sandei (2001). Fertigation experiment with industrial tomatoes. Infomatore Agrario., 57(21):41-44.

Tofino, R.R. and De. Sanchez and M. Prager (1998). Interaction between arbuscular mycrorrhizae and diazotrophic rhizobacteria in red pepper. Acta Agron. Uni. Nacioal de Colombia., 48:3-4.

Troug, E. and A.H. Mayer (1939). Improvement in the deiness calorimetric method for phosphorus and arseni Indian engineering chemical annual Ed., 1: 136 – 139.

Wange, S.S. (1997). Use of biofertilizers and inorganic nitrogen in garlic. Recent-Horticulture, 4:143-144.(CAB Abest. 1998/08-1999/04).

Wankhade, R.S.; M.H. Choudhari and B.H. Jadhao (1996). Effect of graded doses of phosphorus and potash fertilizers on growth and yield of garlic (*Allium sativum L*.). J. of Soils and Crops., 6(1):36-39.

Yuanxin, Li; Jinhui; Ch. Xinzhi; G. Yong; Li. Yx; LI.Hh, X.Z. Chen; Y. Guo and Li. Tl (1998). The effect of NPK mixed application on growth and yields of tomato in solar greenhouse. Advances in Horticulture, 2: 403-407.

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تأثير السماد الحيوى و العضوي و الكيماوى على إنتاجية نبات الباذنجان

فاطمة احمد رزق
قسم البساتين -المركز القومي للبحوث-الدقى - القاهرة

أجريت تجربتان حقليتان بمزرعة المركزالقومى للبحوث في عامي ١٩٩٩و ٢٠٠٠ لدراسة تأثير استخدام السماد العضوي (مخلفات الماشية و الدواجن) والسماد الكيماوى(NPK) مع او بدون السماد الحيوى (الميكروبين) على صفات النمو والمحصول والجودة وكذلك محتوى الثمار من البروتين و النيتروجين والفوسفور و البوتاسيوم و الحديد و الزنك والمنجنيز و النحاس.
وتضمنت أهم نتائج الدراسة مايلى :

١-أدى استخدام السماد الحيوي (الميكروبين) إلى الحصول على افضل صفات للنمو الخضري و افضل كمية محصول (مبكر و كلى طن/ فدان) واعلى قيم للمواد الصلبة الذائبة الكلية كذلك افضل صفات طبيعية للثمار و أعلى محتوى من العناصر الغذائيه فى الثمار.

٢- أدى اضافة مخلوط الاسمدة الكيماوية إلى زيادة صفات النمو الخضري و كذلك أعلي وزن محصول للثمار (مبكر وكلى طن/ فدان) وكذلك أعلي قيم للمواد الصلبة الذائبة الكلية والبروتين الكلي و النيتروجين والفوسفور و البوتاسيوم و الحديد و الزنك والمنجنيز و النحاس مقارنه بالاسمدة العضويه المستعمله .

٣-سجلت افضل صفات للنمو الخضري و أعلى وزن محصول للثمار (مبكر وكلى طن/ فدان) و متوسط وزن الثمار و عدد الثمار على النبات وأعلي قيم للمواد الصلبة الذائبة الكلية وأعلى محتوى للثمارمن البروتين الكلي و عناصر النيتروجين والفوسفور و البوتاسيوم و الحديد و الزنك والمنجنيز و النحاس عند إضافة مخلوط الاسمدة الكيماوية (نيتروجين+ فوسفور+بوتاسيوم) و إضافة السماد الحيوي (الميكروبين) .

Table 3: Effect of bio, organic and chemical fertilizer on the vegetative growth characters of eggplant during 1999 and 2000 seasons.

Treatments		Characters	1999								
			Plant length (cm)	No. /plant		Fresh weight g/plant			Dry weight g/plant		
				Shoots	Leaves	Shoots	Leaves	Whole plant	Shoots	Leaves	Whole plant
Without microbein	Cattle		73.78	6.48	129.11	63.67	105.89	169.56	18.11	26.44	44.56
	Chicken		75.56	7.06	138.30	79.11	139.22	218.33	20.22	29.78	50.00
	NPK		97.33	6.95	159.33	88.00	138.44	226.44	21.67	40.56	62.22
Mean			82.22	6.95	142.33	76.93	127.85	204.78	20.00	32.33	52.26
With microbein	Cattle		93.33	7.37	159.67	91.00	142.67	233.67	19.78	30.89	50.67
	Chicken		94.00	7.30	163.00	106.00	169.89	275.89	21.00	35.11	56.11
	NPK		104.89	7.68	180.33	136.56	182.00	318.56	26.44	44.67	71.11
Mean			97.52	7.45	167.67	111.19	164.85	276.04	22.41	36.89	59.30
Average	Cattle		83.72	6.92	144.39	77.33	124.28	201.61	18.94	28.67	47.61
	Chicken		84.78	7.18	150.67	92.56	154.56	247.11	20.61	32.44	53.06
	NPK		101.11	7.49	169.83	112.28	160.22	272.50	24.06	42.61	66.67
LSD at 5%	Microbein		5.32	0.33	4.19	8.35	20.41	25.81	1.57	1.11	2.55
	Fertilizers		5.16	0.25	2.41	5.25	4.91	8.90	1.32	4.54	5.23
	Interaction		7.30	0.35	3.40	7.43	6.95	12.58	1.87	N S	N S
2000											
Without microbein	Cattle		84.22	3.67	116.44	87.44	82.00	169.44	12.22	16.56	28.78
	Chicken		89.44	4.44	121.67	83.89	92.56	176.44	16.22	20.11	36.33
	NPK		82.33	4.11	123.33	96.00	119.67	215.67	18.11	25.22	43.33
Mean			85.33	4.07	120.48	89.11	98.07	187.19	15.52	20.63	36.15
With microbein	Cattle		90.58	4.56	124.78	108.00	141.89	249.89	18.44	23.89	42.33
	Chicken		90.22	3.89	127.22	117.00	152.11	269.11	20.11	24.22	44.33
	NPK		100.33	4.78	127.67	133.33	166.00	299.33	23.67	28.33	52.00
Mean			93.70	4.41	126.56	119.44	153.33	272.78	20.74	25.48	46.22
Average	Cattle		87.39	4.11	120.61	97.72	111.94	209.67	15.33	20.22	35.56
	Chicken		89.83	4.17	124.44	100.44	122.17	222.61	18.17	22.17	40.33
	NPK		91.33	4.44	125.50	114.67	142.83	257.50	20.86	26.78	47.67
LSD at 5%	Microbein		1.69	N S	1.39	4.59	6.22	10.32	1.54	0.89	2.35
	Fertilizers		N S	N S	1.51	6.74	5.85	9.40	0.90	1.67	1.78
	Interaction		5.20	0.73	2.14	9.53	8.27	N S	1.27	2.37	2.51

Table (5): Effect of bio, organic and chemical fertilizer on some chemical content of eggplant fruits during 1999 and 2000 seasons.

Treatments	Characters	TSS	Protein	%			p.pm			
				N	P	K	Fe	Mn	Zn	Cu
1999										
Without microbein	Cattle	5.22	21.16	3.39	0.581	2.34	6.27	0.172	0.169	0.202
	Chicken	5.48	24.36	3.90	0.636	2.77	7.02	0.174	0.182	0.221
	NPK	5.76	25.30	4.05	0.729	3.32	6.67	0.171	0.177	0.221
Mean		5.48	23.61	3.78	0.649	2.81	6.65	0.172	0.176	0.215
With microbein	Cattle	5.54	25.23	4.04	0.707	3.16	8.61	0.183	0.200	0.227
	Chicken	5.70	25.43	4.07	0.741	3.23	8.84	0.189	0.198	0.239
	NPK	5.67	27.27	4.36	0.802	3.53	8.29	0.180	0.165	0.122
Mean		5.64	25.98	4.16	0.750	3.31	8.58	0.184	0.194	0.226
Average	Cattle	5.38	23.19	3.71	0.644	2.75	7.44	0.178	0.184	0.215
	Chicken	5.59	24.93	3.99	0.688	3.00	7.93	0.181	0.190	0.230
	NPK	5.72	26.28	4.21	0.766	3.43	7.48	0.175	0.181	0.216
LSD at 5%	Microbein	0.14	1.50	0.24	0.016	0.15	0.44	0.004	0.004	0.007
	Fertilizers	0.15	1.19	0.19	0.021	0.15	0.29	0.002	0.004	0.007
	Interaction	0.21	1.68	0.27	N S	0.22	0.41	0.003	0.006	0.010
2000										
Without microbein	Cattle	5.13	16.96	2.71	0.691	2.49	6.12	0.199	0.175	0.171
	Chicken	5.46	17.66	2.83	0.768	2.54	7.02	0.210	0.177	0.175
	NPK	5.44	22.36	3.58	0.709	3.01	6.64	0.212	0.178	0.172
Mean		5.34	18.99	3.04	0.723	2.68	6.60	0.207	0.117	0.173
With microbein	Cattle	5.61	19.82	3.17	0.761	3.30	8.34	0.233	0.195	0.184
	Chicken	5.78	23.10	3.70	0.818	3.39	8.69	0.240	0.205	0.191
	NPK	5.61	25.11	4.02	0.840	3.47	7.74	0.234	0.186	0.179
Mean		5.67	22.08	3.63	0.806	3.39	8.26	0.236	0.195	0.185
Average	Cattle	5.37	18.39	2.94	0.726	2.90	7.23	0.216	0.185	0.178
	Chicken	5.62	20.38	3.26	0.793	2.97	7.86	0.225	0.191	0.183
	NPK	5.53	23.74	3.80	0.774	3.24	7.19	0.223	0.182	0.175

LSD at 5%	Microbein	0.31	1.91	0.31	0.083	0.10	0.11	0.008	0.007	0.002
	Fertilizers	0.11	0.74	0.12	0.037	0.08	0.16	0.002	0.003	0.004
	Interaction	0.16	0.10	0.17	N S	0.11	0.23	0.002	0.004	N S