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RESPONSE OF GROWTH AND YIELD OF *Vicia faba* PLANTS TO SOME ESSENTIAL AND BIO FERTILIZERS.

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ABSTRACT

Two field experiments were carried out during the successive season of 2001/2002 and 2002/2003 at the Experimental Station of National Research Centre in Shalakan (Kalubia Governorate) to study the effect of the essential (NPK, chicken and cattle) and bio (Biogein, Microbein and phosphorein) fertilizers on growth, yield and its some physiological and chemical properties. The important obtained data are following:-

1. Addition of the chemical fertilizer (NPK) obtained the best vegetative growth characters, the heaviest yield as ton/fed., the highest values of N,P,K Mn, Zn, Cu and Fe.
2. Application of Biogein biofertilizer resulted in the highest values of the growth characters, yield and its components and N, P, K, Fe, Zn, Mn, Cu values followed in a descending order by microbein and phosphorein application.
3. The interaction between fertilizer NPK as chemical fertilizer and Biogein as biofertilizer gave the best growth characters, heaviest yield and the high concentration of N, P, K, Fe, Mn and Zn.

INTRODUCTION

In Egypt, broad beans considered the principle winter leguminous crop used as a source of food protein. At present, there is a strong evidence for the beneficial attention was directed to the nature of the relationship between biofertilizers partially those possessing a symbiotic activity and vegetable crops (Gomaa, 1995).

There is a great debate among scientists about the role played by the microorganisms present in biofertilizers in promoting plant growth. Some investigators stressed their contribution to N_2-fixation, P or K solubilization, cellulose decomposition. Others stress the production of plant growth modifying substances by such biofertilizers. Soil microorganisms know as a phosphate solubilizing bacteria play a fundamental role in correcting the solubility problem in many soils, by releasing the fixed form to soluble form to ready for plant nutrition. The organisms capable of carrying out such process are known as phosphate dissolvers (El-Sheekh, 1997). Microbein gave the same effect of full nitrogen application, which saves about 1/3 of the recommended nitrogen application (Bedaiwi *et al.*, 1997).

Biogein has high amounts of symbiotic and non-symbiotic bacteria responsible for atmospheric nitrogen fixation. Its application reduces required mineral nitrogen by 25%. The availability of various nutrients, enhances the resistance of plants to root disease and reduces the environmental pollution from chemical fertilizer application (Rizk and Shafeek, 2000 and Abdalla *et al.*, 2001).

Galal (1991) suggested that combination the chemical fertilizers (ammonium sulphate or urea with an azospirillium microorganisms produced

more nitrogen uptake than those induced with either chemical fertilizers alone. Abdel Wahab *et al.* (1999) reported that applying organic manure and biofertilizer instead of chemical fertilizer may improve soybean production as well as protects the environment from chemical pollution and its harmful effect on human and animal health. Organic manures contain higher level of the elemental requirements of plant growth. Moreover, they play an important role for improving soil physical properties. In addition, fertilization with biofertilizer saved a great amount of chemical fertilization (Bahr, 1997 and Rizk, 2002), the best plant growth and the heaviest yield were associated with addition of organic nitrogen and rate 60 kg P/fed in the form of chicken (Shafeek *et al.*, 2003). Applied of nitrogen in the mineral sources as individual NPK caused the best promotion of plant growth, total and early yield and caused increases in values of physical quality of produced fruits and increased mineral contents of eggplant (Faten, 2003).

MATERIALS AND METHODS

Two experiments were carried out during two successive growth seasons of 2001/2002 and 2002/2003 at the Experimental Station of the National Research Centre, at Shalakan (Kalubia, Governorate) to study the effect of some essential fertilizers (NPK, chicken and cattle) with the inoculation by some biofertilizer (Biogein, Microbein, and phosphorein) on the plant growth, yield and its components of vicia faba as well as the elemental nutrition of it seeds yield.

Whereas, microbein biofertilizer containing nitrogen fixation bacteria like *Rhizobium*, phosphorein containing phosphate dissolvers or vesicular arbuscular mycrohizas and silicate bacteria, but Biogein containing nitrogen fixation bacteria like *Azotobacter*.

The soil of experimental field was clay loam in texture with EC 2.3 mmhos/cm, and pH 7.80, available N was 141 meq/L, P 4.9 meq/L, and exchangeable K was 0.32 meq/L, while chemical analysis of chicken, cattle manures are given in Table 1.

Table 1. The chemical analysis of the used chicken and cattle manures.

Characters	Chicken	Cattle
PH	6.5	6.4
EC (mmhos/cm)	5.70	4.10
Organic carbon (%)	32	7.90
Organic matter (%)	63.20	6.50
Nitrogen (%)	2.95	0.42
C / N ratio	11.10	19.10
Phosphorus (%)	1.14	0.41
Potassium (%)	1.80	0.85
Iron (mg/kg)	168	650
Mn (mg/Kg)	241	135
Cu (mg/Kg)	22	11
Zn (mg/Kg)	110	105

Broad bean seeds cv. Koprosey were sown on 15th and 10th of October in 2001 and 2002 seasons, the experiment plot area was 10.5 m^2 and included 5 rows (each was 3.5 m length and 60 cm width) and the distance between plants was 20 cm. All the essential fertilizers were used at a rate of 61.8 nitrogen units / fed. Whereas, the organic manures (chicken and cattle) were added at once time during preparing the soil for sowing. The chemical nitrogen fertilizer added as a form of ammonium sulphate (20.6%) at two equal times, first before sowing date and the second 45 days late, but phosphorus added as calcium super-phosphate at rate of 100 kgs/fed at once time before sowing. The potassium sulphate applied at 100 kgs/fed at 45 days old. The microbein, phosphorein and Biogein were mixed with broad bean seeds before seeding at rate of 3 packages (600g) of each per fed according to the recommendation of Ministry of Agriculture.

The normal cultural practices used for the broad bean production, i.e. irrigation, fertilization and pest control were followed. Plant samples were taken 75 days after sowing where four plants were chosen from each plot and the following data were recorded: plant length (cm), number of branches, and leaves per plant, fresh and dry weight of whole plant and its different organs as g/plant, yield of each experimental plot (seed and pods) was weighed and expressed per feddan as ton. Samples of 20 pods were taken from each experimental plot and length, diameter and weight of pod (g), also number and weight of seeds / pod were recorded. At the same time, chemical analysis, i.e. N, P and K in dry seeds were determined according to the methods of Pregl (1945), Troug and Mayers (1939) and Brown and Llieland (1964). But, Zn, Fe, Mn and Cu concentration were determined using flame ionization atomic absorption according to the method of Chapman and Pratt (1978).

The obtained data were subjected to the analysis of variance procedure and treatment means were compared to the LSD test according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

A. Vegetative growth characters:

1. Effect of the essential fertilizers:

Table 2 shows the effect of essential fertilizers, i.e. chemical as N P K and organic as chicken and/or cattle on the broad bean plant growth characters during the two experimental seasons of 2001- 2002 and 2002-2003. The vigor plant growth was recorded when plants received NPK as chemical fertilizer. But, when chicken manure applied as an organic manure for *Vicia faba*, the parameters of growth characters recorded values less than that which applied by NPK. Using cattle manure fertilizer gave the poorest growth. The statistical analysis of the obtained data reveals that the differences within the three essential fertilizers were great enough to reach the 5% of significant. Those findings were similar in the two experiments.

Table (2): Effect of some essential and bio fertilizers on plant growth characters of broad bean plant during 2001/ 2002 and 2002/ 2003 seasons.

Fertilizers sources		2001/2002 season							2002/2003 season						
		Plant length (cm)	No./ plant		Fresh weight (gm)/ plant		Dry weight (gm)/ plant		Plant length(cm)	No/ plant		Fresh weight (gm)/ plant		Dry weight (gm)/ plant	
Essential	Bio		Leaves	Stem	Leaves	Stem	Leaves	Stem		Leaves	Stem	Leaves	Stem	Leaves	Stem
Chemical	B	91.6	170.3	7.70	383.3	400.7	112.0	153.0	84.8	163.0	6.37	364.3	334.0	109.4	128.1
	M	86.3	167.6	7.42	380.0	386.7	111.7	147.7	82.4	160.8	6.20	360.6	316.3	108.9	122.4
	P	83.3	162.7	7.22	368.0	371.3	109.0	140.7	80.6	150.8	6.04	341.1	312.2	103.3	119.6
Mean		87.1	166.9	7.45	377.1	386.2	110.9	147.1	82.6	158.2	6.20	355.3	320.8	107.2	123.4
Chicken manure	B	87.0	160.3	7.44	362.0	386.7	107.0	150.7	77.6	148.2	5.91	332.6	297.1	101.9	113.8
	M	85.0	158.7	7.27	358.0	374.7	102.3	148.0	75.3	145.0	5.82	328.1	288.9	99.6	110.9
	P	81.1	155.3	7.21	351.0	371.3	102.7	141.7	73.4	143.2	5.63	322.0	286.3	97.3	110.6
Mean		84.4	158.1	7.31	357.0	377.6	104.0	146.8	75.5	145.5	5.78	327.6	290.8	99.6	111.8
Cattle manure	B	71.2	144.3	5.83	325.0	302.0	95.3	114.6	70.7	138.9	5.66	310.6	282.7	93.8	108.9
	M	66.4	140.3	5.67	316.0	292.0	93.0	111.4	64.7	133.7	5.53	302.3	280.3	91.8	107.5
	P	63.2	138.0	5.55	312.3	287.7	92.3	111.0	52.1	129.7	5.42	291.8	277.3	88.3	106.1
Mean		66.9	140.9	5.68	317.8	393.9	93.6	112.3	62.5	134.1	5.53	301.6	280.1	91.3	107.5
Average	B	83.3	158.3	7.01	356.8	363.1	104.8	139.4	77.7	150.0	6.04	335.8	304.6	101.7	116.9
	M	79.3	155.5	6.79	351.3	351.1	102.3	135.7	74.1	146.5	5.78	330.3	295.2	100.1	113.6
	P	75.9	152.0	6.66	343.8	343.4	101.3	131.1	68.7	141.2	5.72	318.3	291.9	96.3	112.1
LSD at 5% level	Essential	0.3	1.5	0.08	0.8	1.7	1.0	6.9	1.8	1.1	0.10	1.9	1.4	0.3	0.8
	Bio	0.2	0.6	0.04	0.7	2.2	0.5	2.6	1.1	0.5	0.08	1.4	1.1	0.5	0.5
	E *B	0.3	1.1	0.07	1.2	3.9	0.9	N.S	1.9	0.9	N.S	2.4	1.8	0.9	0.9

Where: B, M and P means Biogein, Microbein and Phosphorein respectively.

It could be concluded that the tallest broad bean plants which carried the largest number of leaves, fresh and dry weights of leaves and stems, all of them were produced with using NPK as chemical fertilizer, followed in descending order by applying chicken manure. Moreover, there were no significant differences within that two essential fertilizers of chemical and/or chicken in most parameters of plant growth in both seasons. The obtained data are in good accordance with that which obtained by Faten, 2003 and Shafeek et al,2003.

2. Effect of Biofertilizers:

The effect of using Biogein, microbein and phosphorein as biofertilizers on broad bean plant growth characters of broud bean during 2002 and 2003 seasons are shown in Table 2.

The obtained data indicated that treating broad bean by Biogein caused an enhancement in the values of plant growth, followed in descending order by using microbein and the most weak plants were noticed when phosphorein was used.

The increment in values of plant growth by seed inoculation of Biogein may be attributed to that the broad bean is one of the leguminous plants which needs to nitrogen at the early plant growth stage for the initiation of microorganisms activity particularly, the nitrogen fixation bacteria, whereas, applying Biogein, which already contains that nitrogen fixation bacteria. Thus, may be accelerated the nodulation, yet enhanced plant growth.

Generally, many investigators studied the behavior of some leguminous crops to the nodulation by biofertilizers and reported that, this type of fertilization caused an increase in plant growth parameters (Yanni, 1990; Ahmed *et al.*, 1994; Badr and Estefanous, 1997; Hussein *et al.*, 1999 and Abdalla *et al.*, 2001).

3. Effect of the interaction:

The interaction between using NPK, chicken and cattle as essential fertilizers and the nodulation by Biogein, microbein and phosphorein as biofertilizer and their effects on the growth of broad bean plant during the tow seasons are shown in Table 2. Generally, the interaction treatments significantly affected the various values of plant growth in two experiments, except the dry weight of stems in 1st season and average number of stems in 2nd season. In spite of the no-significant response of the before mentioned, the most vigor plant growth were noticed when *Vicia faba* plant fertilized by NPK as chemical fertilizer and with seed nodulation by Biogein as bio-fertilizer. These were true in both experiments. The same trend of results were recorded by Galal, 1991 and Rizk, 2002.

B. Total yields and its components:

1. Effect of the essential fertilizer:

Broad bean pods characters expressed as length, diameter, average weight (g), numbers / plant and of seeds number / pod, as well as seeds weights expressed as average weight of 100 seeds (g), average weight of

seeds / plant and as (ton/fed) all of them influenced by the different essential fertilizers, i.e. NPK, chicken and cattle fertilizers are presented in Table 3. Whereas, the best values of total yield and its components recorded with that *Vicia faba* plants which supplied NPK as chemical fertilizer, followed in reducing order by that plants received chicken manure, and lastly, by that of cattle manure application. However, the statistically analysis of the obtained data reveals that the variation within the application of the three essential fertilizers were enough to be significantly at 5% level. These were true for all criterias of total yield and its components with exception of length of pod and average number of seeds / pod in 2nd season only. Moreover, the data in Table 3 showed the differences within the two used organic manure were no great in most yield parameters.

It could be concluded that the highest and best quality of broad bean yield under the condition of these experiments were found if that plants were fertilized by chemical fertilizer compared with that received organic manure. These were true in both experiments.

Generally, the superiority in total yield might be attributed to the more solubility and availability of chemical fertilizer over than organic ones. But, the higher values of total yield and its components which obtained by using chicken might be own to its rich in the nutritional values than cattle manure. The obtained results are in good accordance with that of previous investigators such as Bhandari *et al.* (1989) and Shafeek *et al.* (2003).

2. Effect of biofertilizers:

The nodulation of broad bean seeds by Biogein, microbein and phosphorein as biofertilizer had an increase in total yield and its components as shown in Table 3. The seeds treated by Biogein resulted in the highest and best quality of yield, followed in descending order by the nodulation by microbein and lastly by phosphorein. However, the variation within the three biofertilizers were great, to obtain a significant values. However, the response of broad bean plants to biofertilizers were studied by many workers and reported that the yield and its components recorded a significant increase in number and dry weights of nodules, growth and yield of faba bean as compared with untreated treatment (Johal and Chahal, 1994, ,; Badr and Estebanous, 1997 and Hussein *et al.*, 1999). Others reported that the nodulation of bio-fertilizers enhances the resistance of plants to root disease and reduce the environmental pollution from chemical fertilizer application (Rizk and Shafeek, 2000 and Abdalla *et al.*, 2001).

3. Effect of the interaction:

The total yield of faba bean and its quality influenced by the interaction within the essential and bio-fertilizer as shown in Table 3. Whereas, the pod length and diameter, and average number of pods / plant and average weight of seeds / pod in two seasons and average weight of 100 seeds (g) only in 2nd season were not significant responded by the interaction treatment. In spite of the non-significant response, the obtained data reveals that the plants which received the chemical fertilizer (NPK) and their seeds nodulated by Biogein had the great at values of total yield and its components. These were similar in 2002 and 2003 experiments.

Table (3): Effect of some essential and bio fertilizers on total pod yield and its components of broad bean plant during 2001/ 2002 and 2002/ 2003 seasons.

Fertilizer sources		2001/2002 season								2002/2003 season							
		Pod characters			Nos pods/ plant	Nos seeds pod	Seed index	Seed yield plant	Total yield (ton/ fed)	Pod characters			Nos pods plant	Nos seeds pod	Seed index	Seed yield plant	Total yield (ton/ fed)
Essential	Bio	Length (cm)	Diameter (cm)	Weight						Length (cm)	Diameter (cm)	Weight					
Chemical	B	13.77	1.47	15.87	19.37	4.67	125.5	120.6	1.013	11.77	1.33	13.39	15.13	4.42	128.07	109.13	0.987
	M	13.73	1.45	15.60	19.23	4.56	121.27	107.0	0.957	11.46	1.31	13.07	14.57	4.35	128.13	104.67	0.946
	P	13.47	1.42	15.30	19.10	4.43	118.83	102.4	0.923	11.03	1.29	12.71	14.00	4.24	126.73	103.32	0.923
Mean		13.66	1.45	15.59	19.22	4.59	121.90	110.2	0.962	11.42	1.31	13.06	14.56	4.34	127.64	105.71	0.952
Chicken manure	B	13.07	1.40	15.20	19.13	4.40	116.46	96.4	0.952	11.47	1.33	13.17	13.81	3.67	122.90	106.87	0.957
	M	12.90	1.37	14.87	18.70	4.33	113.67	91.6	0.940	11.30	1.29	12.82	13.68	4.25	120.81	102.33	0.926
	P	12.80	1.37	14.77	18.51	4.21	111.20	86.9	0.871	11.03	1.26	12.77	13.24	4.04	119.00	100.32	0.907
Mean		12.92	1.38	14.94	18.81	4.33	113.78	91.6	0.922	11.27	1.29	12.91	13.57	3.99	120.90	103.18	0.930
Cattle manure	B	12.60	1.35	14.23	18.42	4.11	108.01	81.6	0.903	11.41	1.26	12.92	13.57	4.28	120.01	103.66	0.913
	M	12.41	1.34	14.33	18.22	4.07	106.16	79.0	0.886	11.22	1.25	12.53	13.24	4.15	118.32	101.33	0.892
	P	12.07	1.32	14.13	18.13	3.98	103.52	74.6	0.842	11.21	1.22	12.42	13.62	4.00	116.33	94.03	0.877
Mean		12.36	1.34	14.23	18.20	4.02	105.94	78.4	0.880	11.26	1.24	12.63	13.42	4.14	118.21	99.67	0.894
Average	B	13.09	1.43	15.14	19.05	4.44	116.68	99.5	1.041	11.54	1.33	13.21	14.23	4.13	123.71	106.62	1.04
	M	13.00	1.44	14.93	18.74	4.34	113.63	92.7	0.900	11.33	1.32	12.82	13.81	4.21	122.40	102.81	0.93
	P	12.82	1.40	14.73	18.63	4.19	111.24	88.0	0.901	11.12	1.29	12.61	13.60	4.12	120.71	99.23	0.89
LSD at 5% level	Essential	0.08	0.009	0.21	0.19	0.07	0.49	5.2	0.009	N.S	0.02	0.06	0.22	N.S	0.80	0.41	0.02
	Bio	0.08	N.S	0.14	0.22	0.06	0.31	3.9	0.007	0.20	N.S	0.08	0.21	N.S	0.49	0.42	0.01
	E* B	N.S	N.S	0.23	N.S	N.S	0.53	N.S	0.010	N.S	N.S	0.13	N.S	N.S	N.S	0.72	0.01

Where: B, M and P means Biogein, Microbein and Phosphorein respectively.

C. Nutritional values:

1. Effect of the essential fertilizers:

The addition of NPK as chemical fertilizer for broad bean plant caused a significant increase in N, P, K and Fe of the seeds tissue during the two seasons of. Moreover, the chicken manure application had an enhancement in the above mentioned elements if compared with the application of cattle manure. As the same, the behaviour of Mn, Zn and Cu to the essential fertilizers, but by no significant variation. These findings were true in the two experimental seasons.

It could be summarized that the chemical fertilization increased the elemental nutrition in *Vicia faba* seeds. This may be attributed to its availability and solubility, which in turn to present the N, P and K with enough quantity in the suitable time. On the contrary, organic manure needs enough time to change the form of elements from organic to mineral through the mineralization.

Many investigators studied the response of minerals to the chemical and organic fertilizers and obtained a result is in good accordance with that data written here (Faten, etal., 2002 and Faten, 2003).

2. Effect of biofertilizers:

Table 4 shows clearly that the inoculation by Biogein for broad bean seeds caused a promotion in absorbing the elements, hence increased their values in yield seeds. However, the differences within the three biofertilizers which used were significantly only for N, P, K and Fe and were not for the other elements. This findings are in accordance in the two experimental seasons. In spite to the no significant effect of biofertilizer on some elements, but it could be said that, as a general, the biofertilizer had an enhancement on the absorption of the nutritional elements to root tissues, thus did to increase their values in yield tissues.

The biofertilizer "microbein inoculants" play a main role in the transformation of one or more of the plant nutrient elements (Archad and Frankeberger, 1989 and Bedaiwi *et al.*, 1997). Where, the same authors reported that Biogein was the most biofertilizerts make nitrogen available for plant nutrition.

3. Effect of the interaction:

The interaction between the application essential fertilizers and the inoculation with biofertilizer affected the elemental nutrients of seeds yield of *Vicia faba* plant during the seasons of 2001-2002 and 2002-2003. As a general, the application of chemical fertilizer with Biogein resulted in the highest values of minerals in seeds tissue. Whereas, the content of N and Fe in two experiment, K in 1st one and P in 2nd season, all of them responded significantly. Whereas, the results which obtained by Galal, 1991 and Abdel-Wahab *et al.*, 1999 supported the recorded data here.

Table (4): Effect of some essential and bio fertilizers on broad bean seed chemical quality during 2001/2002 and 2002/2003 seasons.

Fertilizers sources		%			ppm				%			ppm			
		N	P	K	Fe	Mn	Zn	Cu	N	P	K	Fe	Mn	Zn	Cu
Essential	Bio														
Chemical	B	4.641	0.693	2.427	7.676	0.223	0.214	0.187	4.120	0.657	2.211	6.471	0.221	0.204	0.184
	M	4.520	0.656	2.386	7.652	0.221	0.211	0.186	4.041	0.642	2.110	6.463	0.220	0.201	0.183
	P	4.417	0.691	2.367	7.663	0.222	0.212	0.187	3.972	0.643	2.022	6.470	0.221	0.202	0.184
Mean		4.532	0.682	2.391	7.662	0.222	0.213	0.187	4.043	0.646	2.113	6.466	0.221	0.202	0.184
Chicken manure	B	4.403	0.663	2.403	7.582	0.221	0.213	0.185	4.103	0.650	2.201	6.342	0.223	0.201	0.183
	M	4.326	0.647	2.356	6.657	0.219	0.212	0.184	3.906	0.632	2.073	6.403	0.219	0.203	0.182
	P	4.223	0.696	2.312	6.746	0.221	0.208	0.187	3.776	0.647	2.005	6.440	0.221	0.201	0.184
Mean		4.321	0.673	2.361	6.990	0.220	0.211	0.186	3.929	0.642	2.091	6.393	0.219	0.201	0.183
Cattle manure	B	4.217	0.666	2.385	7.412	0.220	0.213	0.184	4.003	0.641	1.977	6.211	0.220	0.199	0.183
	M	4.151	0.653	2.342	6.983	0.215	0.212	0.183	3.833	0.623	1.876	6.403	0.218	0.198	0.181
	P	3.897	0.713	2.330	7.687	0.219	0.215	0.185	3.722	0.647	1.773	6.413	0.221	0.196	0.182
Mean		4.093	0.681	2.351	7.362	0.218	0.214	0.184	3.853	0.637	1.876	6.341	0.219	0.197	0.182
Average	B	4.401	0.711	2.399	7.598	0.223	0.213	0.198	4.096	0.643	2.121	6.299	0.231	0.209	0.211
	M	4.343	0.690	2.392	7.143	0.221	0.211	0.196	3.891	0.633	2.021	6.431	0.222	0.210	0.204
	P	4.232	0.704	2.303	7.389	0.219	0.210	0.197	3.788	0.641	1.901	6.423	0.213	0.211	0.208
LSD at 5% level	Essential	0.050	0.019	0.010	0.270	N.S	N.S	N.S	0.037	0.004	0.029	0.003	N.S	N.S	N.S
	Bio	0.031	N.S	0.007	0.203	N.S	N.S	N.S	0.027	N.S	0.022	0.002	N.S	N.S	N.S
	E*B	0.040	N.S	0.010	0.351	N.S	N.S	N.S	0.047	0.007	N.S	0.003	N.S	N.S	N.S

Where: B, M and P means Biogein, Microbein and Phosphorein respectively.

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- wahab, A.M.; G.M.Yakout, E.A.Ali and M.H.Greish (1999). Respons. To soybean grop to phosphatic fertilization, organic manuring and biojertilization under reclaimed sandy soil conditions. Egypt.J.Appi.Sci., 14 (8) : 125 – 138.

Ahmed, M.A.; E.A. Saleh and A.A. El-Fallal (1994). The role biofertilizen in suppression of rhizoctonia root- rot disease of broadbean. Annals of agricultural science, cairo, 1994, 39 : 1, 379 – 395.

Arshad, M. and W.T.Jr. frankenberger (1989). Biosynthesis of ethylene by Acremonium Falciforme. Soil Boil. Biochem., 21 : 633 – 638.

Badr, M.M.A. and A.N. Estefanous,. (1997). Effect of Rhizobium inoculation and foliar spray of some micronutrients on yield of Faba bean- Egypt. S. Appl. Sci. 12 (11), 1997.

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

Bedaiwi, E.H.; R.A. Mitkees; A.M. Eid; M.H. Iskandar; M.M. Iman; Sadek, Abu-Warda and A.M. Hamada (1997). Effects of some Egyptian bio-fertilizers on wheat plants (*Triticum aestivum* L.). Egypt. J. Appl. Sci., 12(1):57-67.

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

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.

Chapman, H.D. and P.F. Pratt (1978). Methods of Analysis for Soils, Plants and Waters. Univ. California, Div. Agric. Sci. Priced Pub., 4034.

El-Sheekh, H.M. (1997). Effect of bio and mineral phosphate fertilizers on growth, yield, quality and storability of onion. Egypt. J. Appl. Sci., 12(12):213-231.

Faten,AbdElal.; A. A. Ahmed and M. M. H. AbdEl-Baky (2002).Growth,yield and nutritional value of squash as affected by town refuse manure and sulphur addition.Egypt.J.appl.Sci.,17(12).716-735.

Faten, Abd Elal (2003). Different nitrogen sources and magnetic iron addition as affected the productivity of eggplant (*Solanum melogena* L.) plant. J. Agric. Sci. Mansoura Univ., 28(4):2903-2916.

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

Gomaa, A.M. (1995). Response of some vegetable crops to bio-fertilization. Ph.D. Thesis, Cairo Univ., Fac. of Agric.

Gomez, K.A. and A.A Gomez (1984). Statistical Procedures for Agriculture Research. 2nd Ed. Willey Inter Science Publ., 357-423.

Hussein, A.H.; S.M Abdel –Wahab, M.A. El-Deab and S.A. Saleh. (1999). Response of baba bean to inoculation as affected by nitrogen, phosphate dissolving bacteria in vewly reclaimed land. Bull. Fac. Agric. Univ. Cairo, 1999, 102 – 107.

Johal, R.K. and V.P.S. Chahal (1994). Effect of Rhizobium inoculation and molybdenum on N- bixation and growth characteristics of mung bean (vigna radiata L.). Indian – journal of Ecology, 1994, 21 : 2, 160 – 162.

Pregl, F. (1945). Quantitative Organic Micro Analysis. 1st Ed. J. and A. Churdil, ltd, London.

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.

Rizk, F.A. 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.

Shafeek, M.R.; Faten S. Abd Elal and Mona M. Abd El-Mouty (2003). The productivity of garlic plant as affected by the addition of nitrogen fertilizer in the form of organic and/or inorganic. J. Agric. Sci. Mansoura Univ., 28(10):7396-7403.

Troug, E. and A.H. Mayer (1939). Improvement in the dewiness colorimetric method for phosphorus and arsenic. Indian Engineering Chemical Annual Ed., 1:136-139.

Yanni, Y.G. (1990). Response of symbiotic interrelationship between soybean and the indigenous or inoculated microsymbiotic, bradyrhizobium japonicum, to soil application of manganese and molybdenum. World, J. of microbiology and biotechnology, 6, 289 – 294.

إستجابة نمو ومحصول نبات الفول الرومى لبعض الأسمدة الكيماويةوالعضوية والحيوية

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أجريت تجربتان حقليتان بمزرعة المركز القومى للبحوث بشلقان فى عامى ٢٠٠١/٢٠٠٢ ، ٢٠٠٢/٢٠٠٣ لدراسة تأثير الأسمدة الرئسية (السماد الكيماوى, سماد الدواجن, سماد الماشية),السماد الحيوى (الميكروبين ، الفوسفورين ، البيوجين) على صفات النمو والمحصول والجودة وكذلك محتوى البذور من عناصر النتروجين ، الفسفور ، البوتاسيوم ، الحديد ، الزنك ، المنجنيز والنحاس. وتضمنت أهم النتائج مايلى:-

١- أدى إستخدام الأسمدة الكيماوية إلى زيادة فى قيم صفات النمو الخضرى والمحصول وأعلى قيم للعناصر الغذائية فى البذور (النتروجين والفوسفور والبوتاسيوم والحديد والزنك والمنجنيز والنحاس) مقارنة بالأسمدة العضوية المستخدمة مثل الدواجن و الماشية.

٢- أدى إستخدام السماد الحيوى البيوجين إلى الحصول على أفضل قيم لصفات النمو الخضرى واعلى قيم لكمية المحصول وأعلى قيم للنتروجين والفسفور والبوتاسيوم والحديد والزنك والمنجنيز والنحاس يليها فى الترتيب الميكروبين والفوسفورين.

٣- سجلت أفضل صفات للنمو الخضرى والمحصول والمحتوى الكيماوى لمعاملة السماد الكيماوى (NPK) مع البيوجين.