Minufiya J. Agric. Res. Vol.36 No. 4:1151 -1164 (2011) **"http://www.mujar.net"**

تأثير التسميد العضوى و النيتروجينى المعدنى والحيوى على المحصول والمكونات الكيميائية لنباتات الذرة

سحر محمد زكريا – رشاد جمعة الصايم – هناء حيم رفله

معهد بحوث الاراضى والمياه والبيئة– مركز البحوث الزراعية–جيزة

الملخص العربي

أجريت تجربتا ن حقليتا ن بقرية الونا يسة مركز إطسا محافظة الفيوم خلال موسمى الزراعة ٢٠٠٨ /٢٠٠٩ و ذلك لدراسة تأثير إضافة التسميد العضوى كخليط مع التسميد المعدني مع إضافة أو عدم إضافة التسميد الحيوى (*Bacillus polymyxa*) على المحصول و مكونا ته والمواد البيوكميائية(المحتوى من الزيت والبروتين والكربوهيدرات الكلية) و المحتوى من العناصر النتروجين والفوسفور والبوتا سيوم لنبات الذرة صنف هجين فردى ٢٠٣٠ . وكانت النتائج المتحصل عليها كالاتى:

١– أ دت المعاملة با لتسميد المعدنى ٧٥%+ ٢٥% تسميد عضوى إلى زيادة معنوية فى المحصول الحبوب ومكو ناته (طول الكوز– وزن المائة حبة –عدد الحبوب لكل صف – عدد الصفوف لكل كوز)

٢– أدت المعاملة بالتسميد المعدنى ٧٥ %+٢٥% تسميد عضوى على حدوث زيادة فى المواد البيوكميائية مثل المحتوى الحبوب من الزيت والبروتين ومحصول الزيت والبروتين و الكربوهيدرات الكلية ومحتوى الحبوب من النتروجين والفوسفور والبوتا سيوم.

٣– كانت أفضل المعاملا ت للحصول زيادة مرتفعة فى محصول الحبوب و مكوناته والمواد البيوكميائية أضافة التسميد المعدنى ٧٥%+٢٥% تسميد عضوى +إضافة التسميد الحيوى بالبكتريا المثبتة للنتروجين (*Bacillus polymyxa*)

وبصفة عامة أدى تسميد نبات الذرة بالسماد العضوى والحيوى وكمية أ قل من التسميد النتروجين المعدنى إلى زيادة فى محصول الحبوب بالاضافة إلى ان انخفاض استخدام الاسمدة المعدنية يؤدى إلى انخفاض التلوث البيئى.

EFFECT OF ORGANIC MANURE, N-MINERAL AND BIO-FERTILIZATION ON GRAIN YIELD AND CHEMICAL COMPOSITION OF MAIZE PLANTS

Sahar M. Zakaria , R.G. El-Sayim and Hanaa H. Rafla
Soils, Water and Environment Res. Inst. Agric. Res. Center, Giza, Egypt.
(Received: May 30, 2011)

ABSTRACT: ***A field experiment was carried out at El Wanysa Village,Itsa district*** **longitude 30˚ 25̀ 25.69", lutitud 30˚ 57̀ 5. 42" and Elevation 5m*;El Fayoum Governorate ,during two successive seasons 2008 and 2009 to study the effect of organic manure mixed with inorganic N fertilizers with or without bio fertilizers of Bacillus polymyxa (paenibacillus polymyxa) on yield, yield components, biochemical compounds (oil, protein and carbohydrates content) and NPK content of maize plants (Zea mays L.) c.v single hybrid 2030.***

The obtained results showed that.

1 –Application of 75%N-mineral+25%O.M significantly increased grain yield/fed and its components(Ear length, seed index, No. of grain /row and No. of row/ear).

2–Biochemical compounds ,i. e oil, protein content in grains ,oil yield , protein yield, carbohydrates yield and macronutrient (NPK) content in grain were significantly increased by using 75% N-mineral+25 %O.M

3 -The best treatment for obtaining the highest grain yield/fed , its component and biochemical compounds was 75% N-mineral+25% O.M+ bio-fertilizer N2-fixing bacteria (Paenibacillus polymyxa)

In general, using O.M, bio-fertilizer improved grain yield and saved considerable amount of N-mineral fertilizers requirements which may help in decreasing the pollution of environment.

Key words: ***Biofertilization, maize, nitrogen fertilization, N,P and K contents, organic manure.***

INTRODUCTION

Maize is the major field crop either in Egypt and the world where it ranks the third one after wheat and rice. It used primarily as feed crop and industrial purposes for oil and starch extraction.

Nitrogen is an essential element required for plant growth. It is a fertilizer in a balance and rational way to keep high and stable yield in important component of proteins, enzyme and vitamins in plant and central part of the chlorophyll, the essential photosynthetic molecule. Also its one of the most

important factors in increasing the productivity of cereal crop. The excessive application of mineral fertilizers led to increase production cost. Thus, there is a global need for reducing the dependence on chemical fertilizers of agricultural production. In this respect, considerable saving in nitrogen fertilizer can be made using organic fertilizer which can supply both macro and micronutrients quantities nearly as much as in chemical fertilizer in addition to its good effect on soil conditions. The studies of Pimpini *et al.* (1992) and Metwally. (2006) reported that organic manure is an important and save source of plant nutrients for both increasing crops production and decreasing environment hazard caused by intensive mineral fertilization. The positive effects of mineral fertilization and farmyard manure at different rats either alone or in combination with others on growth , yield and chemical constituents in different plans were recorded by many researchers (Solman *et al*., 2002 and Abdalla, 2003). Also organic fertilizers considered as an important source of humus, macro and microelements carrier and at the same time increase the activity of the useful microorganisms (El--Gizy, 1994). Dahdouh *et al* ., (1999) found that organic manures play an important role in nutrients solubility which activate physiological and biochemical processes in plant leading to increase the plant growth and nutrients uptake. The best means of maintaining soil fertility and productivity level could be achieved through periodic addition of proper organic materials in combination with inorganic fertilizer (Sakr *et al*. 1992), Tolessa and Friesen(2001) reported that the growth and yield of maize increased significantly with the application of FYM enriched with chemical fertilizer. Wahba(1997) reported that seed yield of sesame as well as oil yield were increased by application of ammonium sulphate with organic manure .

The effect of bio-fertilizers (microbial inoculants) on many plants have been established, which effectively supplement the nitrogen and reduce the cost of production and environmental pollution via reducing the rates of mineral –N fertilizer used (Ouda, 2000). Several researchers reported that the inoculation of some plants with bio-fertilizers combination with mineral fertilizers improved yield and its components and chemical composition. (Ewais-Magda *et al*.,2009; Abdel-Mouty *et al*., 2002; Moharrm *et al*., 1997; Omar *et al.,* 1996). Also Abd El-Hady *et al*. (2006) reported that combined application of N-mineral , farmyard manure and bio(*Bacillus polymyxa*) to wheat plant increased yield ,its component and protein content.

The present investigation was conducted to study the effects of organic manure, mineral nitrogen fertilizer and bio-fertilizer on yield, yield components and chemical composition of maize plants grown on clayey soil

MATERIALS AND METHODS

A field experiment was carried out on maize (Zea mays L.) c.v single hybrid 2030 at El Wanysa Village ,Itsa district; El Fayoum Governorate

(longitude 30˚ 25̀ 25.69", lutitud 30˚ 57̀ 5. 42" and Elevation 5m) during two successive seasons 2008 and 2009 to study the effect of oraganic manure and inorganic N fertilizers with or without bio fertilizers *Bacillus polymyxa* (paenibacillus polymyxa) on yield ,yield components, NPK content, and biochemical compounds. Grains were inoculated with (*Bacillus polymyxa*) that were supplied by Department of soil Microbiology Soils, Water and Environment Res. Institute Agric. Res. Center at the rat of 1 kg/fed.

The experiment was arranged in split plot design with ten treatments in three replicates. All treatments included the control were treated with 30Kg P_2O_2/fad as super phosphates (15%P_2O_2) and 24 kg K_2O/fed as potassium sulphate (48% K_2O) added after 15 and 40 from planting. . Nitrogen was added with 120 Kg N/fed as ammonium nitrate (33.5%N)as recommended dose (R) and also in levels of nitrogen(25%, 50%, 75%,100% of the recommended rate) and organic manure was added before planning by about one week at (5,10,15 and20m^3/fed) respectively the studied treatments may be listed as follow :

The % from recommended dose of N fertilizer + % from organic manure was located in a main plots:

1- **control 100%N**
2- **75% N fertilizer + 25% O.M (compost)**
3- **50% N + 50% O.M (compost)**
4- **25%N + 75% O.M (compost)**
5- **100% O.M only (compost)**

Biofertilizer located as subplot (with *Bacillus polymyxa* and without *Bacillus polymyxa*).

The area experimental plot was 3m x 3.5 m (10.5 m^2). The O.M was thoroughly mixed with soil surface a week before planting.

The soil sample was collected before planting to determine some chemical and physical analysis according to Black (1965) as show in Table (1). Also, chemical analysis of used FYM was carried out according to Page (1982) and the obtained data were recorded in Table (2).

At harvest stage, the following characters were estimated:

1-Ear height (cm).
2-Ear diameter (cm).
3-Number of rows/ear
4- Number of grains/row.
5-Weight of 100 grain. (grain index)
6- Weight of grains (kg/fed).

Determination of macronutrients was done as described by Jackson (1973). And Page (1982). Moreover, the biochemical constituents in maize

grains such as protein (nitrogen % x 5.75), total carbohydrates and oil were evaluated by A.O. A. C. (1990). All the obtained data were tabulated and subjected to statistical analysis according to Snedecor and Cochran (1982). In addition to the combined analysis of two seasons according to Steel and Torrie (1960).

Table (1): Some physical and chemical properties of the experimental soil

Soil characteristics	Value
Particle size distribution (%):	
Sand	30.15
Silt	16.43
Clay	53.42
Soil textural	Clayey
Soil chemical analysis:	
Soil $CaCO_3$%	5.18
Soil organic matter (%)	1.8
pH (1:2.5,soil:water suspension)	7.45
EC_e (dS/cm) in soil paste extract	2.65
Soluble ions in soil paste extract (me/l):	
$CO_3^{=}$	--
HCO_3^{-}	2.27
Cl^{-}	12.25
$SO_4^{=}$	6.87
Ca^{+2}	4.83
Mg^{+2}	3.17
Na^{+}	12.96
K^{+}	0.43
Available nutrients (mg/kg soil):	
N	42.0
P	11.20
k	450

Table (2): chemical analysis for the used compost manure

pH (1:10)	EC dS/m (1:10)	O.C %	C/N	O.M %	Total elements		
					N	P	K
7.62	4.38	22.14	15.06:1	39	1.47	0.66	1.21

RESULTS AND DISCUSSION

Effect of The Studied Treatments on Yield and its Components of Maize

Data concerning yield and its components, expressed as grain index, ear length, No. of grains/row, ear diameter, No. of rows/ear, yield kg/fed are present in Table (3). The interaction between organic manure and N –mineral fertilizer gave the best results compared with control (inorganic fertilizers only). The highest value of yield and its components were obtained at75% N-mineral fertilizer with 25% O.M treatment. In general the interaction effect between organic manure and N –mineral significantly increased grains yield and its components (ear length, grain index, No. of grains/row, No. of row/ ear) while insignificantly increased was obtained for ear diameter. The positive impacts of organic manure on yield and its components are mainly due to improving the soil physical and chemical properties, preparing the suitable bed for germination and development of plant growth that reflect on resultant yield. Moreover, organic manure is considered as an important source of humus, macro and microelement carrier, and in the same time increase the activity of the activity of the useful microorganisms. Also nitrogen is one of the most important components of cytoplasm, nucleic acid and chlorophyll , so nitrogen has an important role in encouraging cell elongation, cell division and consequently increasing vegetative growth and activation of photosynthesis process which enhance the amount of metabolites necessary for building plant organs which reflect increases in grain and straw yields . The results are in accordance with those obtained by Tolessa and Friesen (2001) on maize, and Abd El-Rasoul et al.(2003)on wheat. Also, Ali –Laila (2004) mentioned that the combined application of N-mineral and organic manure as the mixture of (N-mineral: N-organic) gave the highest grain yield of maize and wheat as compared to the other mixture treatments. Mahmoud *et al*. (2006) mentioned that grain and straw yields of sesame and wheat progressively increased with increasing the applied ratio of N-mineral: N-organic. Where the maximum yield was scored under the treatment of 75% N-minerel+25% organic manure. Data also in Table (3) revealed that application of 75%N - mineral fertilize +25% O.M + bio-fertilizer (*Bacillus polaymxa*) caused insignificantly increased grain index, ear length, ear diameter, No. of rows/ear, while significantly increased No. of grains/row and grain yield compared with the other mixture treatments. Such results show due the beneficial effects of biofertilizers on yield and its components of plant which caused N-fixation or production of plant growth promoting substances such as indol actic acids, gibberellins, pyridoxine and others which stimulate plant growth and subsequently affect yield attributes. These results agree to a great extent with those reported by Ahmed *et al*. (1997) on groundnut, Metwaly (2000) on wheat, Ibarahim *et al*., (2005) mentioned that using seed inoculated with (*Azospinillum brasilense*) as biological nitrogen

fixation bacteria under different levels from N-mineral were significant positive on plant height , ear length, grain yield,100 kernel weight of maize, and Ewais- Magda *et al*., (2009) on onion. In here, the importance of the superiority for the applied N-bio fixation was not only taken as a criterion for increasing for increasing the outputs for maize crop or rationalize of costly N-mineral fertilizers, but also for minimizing the possible adverse fears of both human health and environmental risks resulted from N-mineral fertilizers (Palm *et al*., 2001). Thus, supplying N-bio fixation for plant varieties need an excessive use mineral or chemical fertilizers .especially those of nitrogenous ones, is undoubtedly of great importance .In general, the superiority of applied N –fixation bacteria is more attributed to their biological activity in the decomposition of organic substances ,which have ability to improve soil- moisture regime, enhancing the released nutrients and fixed as a storehouse in more mobile or available forms to uptake by plant roots (Salib, 2002).

Table (3): Effect of organic manure, mineral nitrogen fertilizer, biofertilizers and their interaction on yield and its components of maize plants (mean values of two growth seasons)

Treatments of N + O.M (A)	Inoculation (B)	Ear height (cm)	Grain index	No. of grains/row	Ear diameter	No. of rows/ear	Grain yield (k/fed)
100%N recommended	Without *Bacillus polymxa*	20.50	35.40	50.5	5.40	11.0	2843.5
75%N+25% O.M		22.00	37.89	52.0	5.56	12.0	3187.8
50%N+50% O.M		21.00	34.58	49.0	5.50	11.0	3085.7
25%N+75% O.M		21.00	33.51	48.0	5.45	11.0	3010.6
100% O.M		18.00	26.53	39.0	5.30	11.0	2670.5
100%N recommended	With *Bacillus polymxa*	21.75	36.76	51.0	3.65	12.0	2891.5
75%N+25% O.M		23.50	38.65	56.0	5.85	13.0	3375.0
50%N+50 %O.M		22.73	35.53	53.0	5.75	12.0	3279.5
25%N+75% O.M		22.00	35.03	53.0	5.70	12.0	3199.5
100% O.M		19.00	28.80	41.0	5.35	12.0	2789.5
L.S.D.at 5%							
A		0.541	2.485	1.63	n.s	0.42	40.93
B		0.496	0.385	0.993	0.104	0.496	102.49
AXB		n.s	n.s	1.92	n.s	n.s	122.50

*** O.M: Organic Manure (Compost)**
Grain index= Weight of100grain

Effect of Effect of The Studied Treatments on N,P and K Concentration and Uptake by Maize Grains

Data in Table (4) showed the interaction between organic manure and N-mineral treatments was significantl for N,P and K-concentration(%)_and uptake. In this respect, the content of N, P, K were significantly increased till reaching the figures at the treatment of 75% N-mineral+25% O.M. These increases were 2.55, 83.56, 7.6, and 15.33, 106.59, 20.71 % for NPK concentration and uptake, respectively. Application of organic manure increased the content of NP K of maize grain. This may be due to the decomposition of organic manure supplying more available nutrients as well as formation of organic and inorganic acids decomposition which slightly reduce the soil pH which in turn enhanced the solubility and availability of N. P, K and other essential micro-nutrients. These beneficial effects are in agreement with those reported by El-kouny *et al.,* (2004). Also the application of N-mineral increased the uptake of NP K of maize grain. This might be attributed the increase of dry matter and subsequently increase nutrients absorbed by in maize plant. Similar results were obtained by Imara and Hamissa((2000),Karki *et al.* (2005) on corn. Hassan and Mohey El-Dain (2002) reported that the increasing of NPK concentration and uptake in wheat plants with FYM application, may be attributed to the mineralization of organic matter and slow releasing of minerals in an available from organic manure, or may be due to the effect of several organic acids, produced during manure decomposition, which solublize the native P of the soil and partly due to the formation of a coating on CaCo3 which did not allow to react with soil P, and thus P availability increased. The bicarbonate ions released from O.M decomposition might also increase P availability through ion exchange phenomenon, a swell as displacement of phosphate by organic anion formed from break down of O.M. Moreover, Mahmoud *et al*. (2006) sated that, the combined application of N-mineral and organic manure in the mixture of 75% N-mineral + 25% N-organic gave the highest N,P, and K content in wheat grains.

The superiority positive effect for the applied treatment 75% N- mineral + 25% O.M + biofertilizer (*Bacillus polymyxa*) was achieved, since it exhibited relatively high values for NPK concentration and uptake increase percentage reached 9.5,94.06,17.9,30.06,131.22,40.% for maize grain compared with control (N-mineral alone), respectively. The positive effect of biofertilizer inoculation upon nutrient uptake could be described to the high efficiency of bacteria presence in this biofertilizers to fix atmospheric nitrogen and/or to produce some biologically active substances. e.g. IAA,gibberellin and cytokinins. Such substances would help in increasing the root biomass and thus indirectly help in greater absorption of nutrients from surrounding environment (Awad,1998). Moreover, kotb, (2005) reported that N2-fixing bacteria (Azotobacter and Azospirillum) strains produced adequate amounts

of IAA and cytokinins, which increase the surface area per unit root length and are responsible for root hair branching and eventually increase the uptake of nutrient. Similar results were obtained by Moharram *et.al.* (1997) on wheat and Eawis-Magda *et. al*., (2010) on wheat

Table (4): Effect of organic manure, nitrogen fertilizer, biofertilizers and their interaction on N, P, K concentrations and total content in grains (mean values of two growth seasons)

Treatments of N + O.M (A)	Inoculation (B)	Nutrients concentration (%)			Nutrients uptake (kg/fed)		
		N	P	k	N	P	k
100%N recommended	Without *Bacillus polymxa*	1.57	0.219	0.289	44.5	6.20	8.21
75%N+25% O.M		1.61	0.402	0.310	51.32	12.82	9.91
50%N+50% O.M		1.49	0.373	0.300	45.83	11.51	9.24
25%N+75% O.M		1.37	0.355	0.307	41.11	10.67	9.23
100% O.M		1.28	0.328	0.264	34.05	8.75	7.05
100%N recommended	With *Bacillus polymxa*	1.67	0.411	0.299	48.14	11.88	8.65
75%N+25% O.M		1.72	0.420	0.341	57.88	14.34	11.49
50%N+50% O.M		1.52	0.382	0.333	49.68	12.53	10.92
25%N+75% O.M		1.40	0.388	0.326	44.79	11.76	10.40
100% O.M		1.34	0.322	0.278	37.24	9.25	7.74
L.S.D.at 5%							
A		0.007	0.075	0.020	0.469	2.08	0.70
B		0.0007	n.s	n.s	1.42	n.s	n.s
AX B		0.008	n.s	n.s	1.52	n.s	n.s

***O.M :Organic Manure (Compost)**

Effect Of The Studied Treatments on Oil, Protein, and Total Carbohydrates content

Data in Table (5) the content % of both oil and protein in maize grains significantly increased while the content (%) total carbohydrates decreased as well as oil yield, protein yield, carbohydrates yield were significantly increased by interaction between organic manure and N- mineral fertilizer. In this respect, the chemical constituents of grain were gradually increased till reaching the figures by treatment of 75% N-mineral+ 25 %-O.M. The increases were .85, 2.9, 11.23and 15.34, 11.12 for content (oil, protein%) and yield oil, protein and carbohydrates compared with control (N-mineral alone),

respectively. The application of O.M increased the concentration of chemical constituents of grain. This may be due to the ability of organic matter in rendering soil nutrients more available and chelating of these elements by humic substance. This may helps to increase the respiration rate, the metabolism and the growth of plant that causing the plant required to more nutrients from soil and fertilizers. Also the beneficial effect of nitrogen fertilization on protein yield may be due to; its favorable effect on grain yield (Table3) and/ or to enhance the absorbing efficiency of the roots. .Besides, the stimulating effect of nitrogen may be due to its function in plant metabolism as it considered a major constituent of amino acid, protein, nucleic acids and phospholipids. Similar results were obtained by Wahba (1997) who reported that application of ammonium sulphate with organic manure gave higher seed oil content and oil yield than the treatments received single application of ammonium sulphate., Ewais-Magda *et al*., (2005) on onion and Mahmoud *et al.*, (2006) indicated that seed oil content and oil yield of sesame was positively affected by combined treatments of 75% N-mineral+25% N-organic. Also, the crud protein content in wheat grains increased and achieved the greatest value under the treatment of 75 %N-mineral + 25% N-organic. Data in Table (5)further show, the interaction between 75% N-mineral + 25% O.M + bio fertilizers (*Bacillus polymyxa*), significantly increased some biochemical compounds(oil %, protein%, oil yield) while insignificant increased was obtained for protein yield, total carbohydarat of grain than the control (N-mineral alone). The increases percentages were 7.29, 9.64,26.33,30.06 and 14.52 % for oil, protein content, oil yield, protein yield and carbohydrates yield compared with control (N-mineral alone), respectively. These results might be due to the increase in vegetative growth characters, as well as the yield components (i. e ear length, ear diameter and seed index). Moreover, grain content increases might be due to the fact that (*Bacillus polymyxa*) stimulates root growth , changes root morphology and enhances uptake of minerals. It is also possible due to the invotvement in phytohormones production which all together might cause promotion of vegetative growth characters and induction of some biochemical compounds. The result agreement with those obtained by Ahmed *et.al*., (1997) on groundnut. Ali-Nadia *et al*., (2002) and Ewais- Magada *et. al.* (2010) stated that, the increase in the protein content in grains can be attributed to the ability of N- fixing bacteria to fix atmospheric nitrogen together with high production of growth promoting substances that enhance root development and function and stimulate seed germination, shoot and root length , and subsequently increased nutrients uptake in wheat plants.

Table (5): Effect of organic manure, nitrogen fertilizer, biofertilizers and their interaction on protein, oil and total carbohydarate contents of maize grain(mean values of two growth seasons)

Treatments of N+O.M (A)	Inoculation (B)	Oil %	Protein %	Total carbohydrate %	Oil (kg/fed)	Protein (kg/fed)	Total carbohydrate (kg/fed)
100%N recommended	Without *Bacillus polymxa*	6.99	8.99	72.80	200.32	255.75	2070.35
75%N+25% O.M		7.05	9.25	72.18	222.82	295.03	2300.70
50%N+50% O.M		6.95	8.53	71.90	214.30	263.37	2217.79
25%N+75% O.M		6.89	7.84	71.50	207.42	236.25	2151.71
100% O.M		6.78	7.33	71.25	181.06	195.75	1902.25
100%N recommended	With *Bacillus polymxa*	7.15	9.57	71.00	206.74	276.71	2053.00
75%N+25% O.M		7.50	9.85	70.25	253.08	332.58	2371.12
50%N+50% O.M		7.44	8.70	70.80	243.83	285.47	2321.91
25%N+75% O.M		7.35	8.01	70.90	235.01	256.44	2268.44
100% O.M		7.25	7.67	70.70	202.25	213.95	1972.13
L.S.D.at 5%							
A		0.12	0.420	0.452	12.40	7.59	44.078
B		0.130	0.005	n.s	16.62	11.70	33.13
AX B		.21	0.0480	n.s	18.22	n.s	n.s

O.M: Organic Manure (Compost)

Conclusion

From the obtained data it could be concluded that grain inoculation with Bacillus Polymyxa combined with the application of 75% N (of the recommended rate) mixed with 5m^3/ fed organic manure was sufficient to produce the high quantity and quality of maize crop.

REFERENCES

Abdalla, A. M. (2003). Evaluation of three garlic cultivars (Egyptian, and volatile oil ompounds). Egypt. J. Appli. Sci..18 (10) :296-303 .

Abd El- Hady, M. N., M. A. El Habbal, N. A. Noureldin, M. F. Hamed (2006). Response of wheat productivity and quality to bio, organic and inorganic fertilizer.Annals of Agricultural Science (Cairo).Faculty of Agriculture, Ainshm University,Cairo,51(1) 103-111.

Abdel-Mouty- Mona, M., H. A. Nisha and Fatma A. Rizk (2002). Potato yield as affected by interaction between bio and organic fertilizers. Egypt, J. Apple. Sci 16(6):267-276

Abd El-Rasoul, Sh. M., S. M. El- Sadany, M. Hassan and Amira A. Salem (2003). Comparison between the influence of some bio-fertilizer or effective microorganisms and organic or inorganic fertilization wheat grown on sandy soil. Egypt,J. Appl. Sci.; 18(6): 388-408.

Ahmed, M. K. A., A. O. M. Saad, A .T. Thalooth and M. O. Kabesh (1997). Utilization of bio fertilizers in field crops production, 10- yield response of groundnut to inorganic, Organic and bio-fertilizers Annals Agric. Sci.,Ain Shamas Unive.,Cairo,42 (2),365-375.

Ali-Laila. K. M. (2004). Changes in nitrogen content in different soil layers after application of composted and fresh chicken manure and nitrogen mineral during maize and wheat cultivation in sandy soil .Annals of Agric. Sc.,Moshtohor. 42: 1415-1430.

Ali- Nadia, A. A., D. S. Darwish and M. S. Mansour (2002). Effect of Azotobacter chroococcum and Azospirillum brasidlense inoculation and anhydrous ammonia on root colonization, plant growth and yield of wheat plant under saline alkaline condition. J. Agric. Sci. Mansoura Univ., Egypt. 27 (8): 5575-5591.

A. O. A. C. (1990). Official Methods of Analysis 15th Ed.Association of Official Anaytcal Chemists,Washington,D .C.,U S A.

Awad, N.M. (1998).The use of microorganisms in ecological farming system. Ph.D. Thesis,Fac. Sci., Cairo Univ.

Black, C. A. (1965). Methods of Soil Analysis. Part 1, Amer. Sco. Of Agron. Ince., Madison,Wisconsin, U. S. A

Dahdouh, S. M. A., Fatma A. Ahmed. and F. M. Salem (1999). Effect of organic manure and foliar application of some macro and micronutrients on wheat. Zagazig J.Agrric. Res. 26 (2):445-456.

El-Gizy, Samiea, M. (1994). Comparative study for influence of manure sources on growth yield and pod quality of pea. Minufiya J Agric . Res. 19. (6): 3243-3257.

El-kouny, H. M., A. I. Sharaf and A. M. El-Naggar (2004). Effect of compost application and saline irrigation water on the production of Roselle pplants cultivated in lacustrine soil. J Adv. Agric Res Fac. Agric. Saba Basha 9:909-929.

Ewais-Mada, A., Amina A. Abd El-Latif, Awatef A. Mahmoud and M.M. Abd El-Ghain (2005). Integrated effect of organic and inorganic fertilizer on growth, yield andNPk uptake by onion grown on sandy soil. Egypt. J. of Appl. Sci., 20 (10A) 702-716.

Ewais- Magda, A., Dalia A. Sayed and Abir A. Azoz (2009). Effect of bio-fertilization and nitrogen fertilizer levels on growth, yield and quality of onion plants. Minufiya J.Agric. Res 34 (5) :1927-1944.

Ewais-Magda. A., Awtef A. Mahmoud and S.A. El-Shikha (2010). Influence of organic ,N-mineral and biofertilization on growth, yield and chemical composition of wheat plants. Minuifya J. Agric. Res. Vol.35 No.3: 1125-1146.

Hassan, H. A. and M. M. Mohey El-Din (2002). Effect of the organic manure application on some soil chemical properties yield nutrients uptake and nitrogen use efficiency by winter wheat growth in newly reclaimed sandy soils. Minia J.Agric. Rs. And Develop. (22) .(4pp). 381-406.

Ibrahim, A. M., Seaf El Yazal S . A. and R. G. El Sayim (2005) .Response of maize vegetative growth and yield to partial N-mineral replacement by biological nitrogen fixation under different soil moisture stresses .J. Agric. Mansoura Univ.,30 (4) 2273-2273.

Imara, Z. M. and A. M. Hamissa (2000). Effect of plow types, plowing depth, oraganic manure and N fertilization on corn yield. Misr;J Ag. Eng.,17 (1): 17-30.

Jackson, M. L. (1973). Soil Chemical Analysis. Prentice. Hall of Indian Preivate limited, New Delhi.

Karki, T. B., K. Ashok and R. C. Gautama (2005). Influence of integrated nutrient management on growth, yield, content and uptake of nutrients and uptake of nutrients and soil fertility status in maize (*Zea mays*).Indian Journal of Agricultural Science 75(10): 682-685.

Kotb, M. Th. A. (2005). Increasing the efficiency of chemical N-fertilizers using biofertilizers for wheat. Egypt. J of Appl. Sci.,20(9) 352-374.

Mahmoud, M. M., Gehana H. Youssef and Wafaa M. Saddik (2006). Partial replacement of N-mineral requirements by N-organic source as related to both sesame-wheat yields and their components . Egypt. J. of Appl. Sci.,21(6B) 781-792.

Metwally, S. Gh. (2000). Fertilizer use efficiency of wheat as affected by microbial inoculation and soil conditions. Ph.D. Thesis of Agric. Mansoura Univ. Egypt.

Metwally, S. G. (2006). Response of cotton to biofertilizer inoculation and farmyard manure under different levels of inorganic nitrogen . J. Agric. Mansoura Univ.,31(12): 8047-8055.

Moharrm, T.M. M., M. S. A. Safwat, M. M. Farghaly and M. Z.H. Ali (1997). Effect of inoculation with Bacillus polymyxa on growth and nitrogen fixation of wheat under graded levels of inorganic and organic nitrogen. Egypt. J.Microbial., 32(1): 1 -15.

Omar, M. N. A., N. M. Mahrous, A. M. Hmouda (1996). Evaluating the efficiency of inoculating some diazotrophs on yield and protein content of 3 wheat cultivars under graded levels of nitrogen fertilization. Annals . Of Agric. Sci., Cairo, 41 (2): 579-590.

Ouda, A. M. M. (2000). Physicologicol studies on tomato yield and its components. Ph.D.Thesis,Fac. Sci., Mansoura,Unive.,Egypt.

Page, A. L. (1982). Methods Of Soil Analysis .Part 2: Chemical and microbiological properties. Soil Sci. Amer. Inc., Madison, Wisconsin, USA.

Palm, C. A., C. N. Gachengo, R.J. Deleve, G. Cadisch and K. E. Giller (2001). Oraganic inputs for soil fertility management in tropical agro ecosystems application of organic resource database. Agric. Ecosyst. Environ., 83 (1-2): 27-42.

Pimpini, F., L. Giardin, M. Borin and G. Gianquinto (1992). Effect of poultry manure and mineral fertilizer on the quality of crops J. of Agric .Sci. 118:215-221.

Sakr, A. A., A. S. Rizk and S.A. Sebaay (1992). Effect of organic manures on plant growth and NPK uptake by wheat and maize plants. Egypt J. Soil Sci 32 (2); 249-263.

Salib, M. M. (2002).The integrated effect of humic and micronutrients in combination with effecative micro-organisms on wheat and peanut grown on sandy soils. Zagazig.J. Agric. Res.,29(6):2033-2055.

Snedecor. G. W. and W. G. Cochran (1982). Statistical Methods 7th Ed., Iowa Stat call. Press, Iowa. U.S.A.

Solman, S.R., O. M. Sawan and A. M. Eissa (2002). The effects of different levels and sources of organic fertilizers on NPK status, yield and quality of watermelon growing in new reclaimed soil. Egypt. J. Appl. Sci., 17 (10):665-683.

Steel, R. G. D. and J. H. Torrie (1960). Principles And Procedures Of Statistics: A biometrical approach. 2nd Ed Megraw Hill, New York, U.S A

Tolessa, D. and D. K. Friesen (2001). Effect of enriching farmyard manure with mineral fertilizer on grain yield of maize at Bako, Western Ethiopia. Seventh Eastern and Sowthern Africa Regional Maize Conference. Pp 335-337. 11-15 Februaty, 2001.

Wahba, H. W.A. (1997). Effect of some fertilizer treatments on sesame under sandy soil condition. Ph. D. Thesis, Fac. Of Aric., Moshtohor, Zagazig Univ., Egypt

تأثير التسميد العضوى و النيتروجينى المعدنى والحيوى على المحصول والمكونات الكيميائية لنباتات الذرة

سحر محمد زكريا – رشاد جمعة الصايم – هناء حيم رفله

معهد بحوث الاراضى والمياه والبيئة– مركز البحوث الزراعية–جيزة

الملخص العربي

أجريت تجربتا ن حقليتا ن بقرية الونا يسة مركز إطسا محافظة الفيوم خلال موسمى الزراعة ٢٠٠٨ /٢٠٠٩ و ذلك لدراسة تأثير إضافة التسميد العضوى كخليط مع التسميد المعدني مع إضافة أو عدم إضافة التسميد الحيوى (*Bacillus polymyxa*) على المحصول و مكونا ته والمواد البيوكميائية(المحتوى من الزيت والبروتين والكربوهيدرات الكلية) و المحتوى من العناصر النتروجين والفوسفور والبوتا سيوم لنبات الذرة صنف هجين فردى ٢٠٣٠ . وكانت النتائج المتحصل عليها كالاتى:

١– أ دت المعاملة با لتسميد المعدنى ٧٥%+ ٢٥% تسميد عضوى إلى زيادة معنوية فى المحصول الحبوب ومكو ناته (طول الكوز– وزن المائة حبة –عدد الحبوب لكل صف – عدد الصفوف لكل كوز)

٢– أدت المعاملة بالتسميد المعدنى ٧٥ %+٢٥% تسميد عضوى على حدوث زيادة فى المواد البيوكميائية مثل المحتوى الحبوب من الزيت والبروتين ومحصول الزيت والبروتين و الكربوهيدرات الكلية ومحتوى الحبوب من النتروجين والفوسفور والبوتا سيوم.

٣– كانت أفضل المعاملا ت للحصول زيادة مرتفعة فى محصول الحبوب و مكوناته والمواد البيوكميائية أضافة التسميد المعدنى ٧٥%+٢٥% تسميد عضوى +إضافة التسميد الحيوى بالبكتريا المثبتة للنتروجين (*Bacillus polymyxa*)

وبصفة عامة أدى تسميد نبات الذرة بالسماد العضوى والحيوى وكمية أ قل من التسميد النتروجين المعدنى إلى زيادة فى محصول الحبوب بالاضافة إلى ان انخفاض استخدام الاسمدة المعدنية يؤدى إلى انخفاض التلوث البيئى.