Minufiya J. Agric. Res. Vol. 33 No.1: 181 - 194 (2008)

EFFECT OF ORGANIC FERTILIZERS AND IRRIGATION REGIME ON NUTRIENT AVAILABLITY AND SOYBEAN PRODUCTIVITY

O.F. El-Sedfy

Soils, Water and Environ. Res. Institute, Agric. Res. Center. Giza, Egypt

(Received: Oct. 30 , 2007)

ABSTRACT: ***A field experiment was carried out at Ismalia Agric. Exp. Res. Station through the summer season 2005 to study the impact of applied organic fertilizers and irrigation regime on some soil physical propertes as well as soil available macro and micro-nutrients and soybean productivity. The experiment was laid out in a split plot design with four replicates. Irrigation treatments were placed in the main plots, while applied organic fertilizers in the sub plots.***

The obtained results indicated that the highly significant increase of total porosity, available water and soil available NPK were achieved under W_2 treatment. However, no significant effect of irrigation regime was obtained on soil available micro-nutrients.

Applying 6 ton Biocomposite/fed realized the highest value of organic matter. While, the highly significant increment of total porosity and available water were achieved by applying 6 ton compost/fed. Moreover, the highest significant increase of available N, P, K, Fe, Zn, Mn and Cu were obtained as a result of applying 6 ton Biocomposite/fed. The maximum value of soybean seed yield was realized by applying 6 ton Biocomposite/fed under W_2 treatment. However, the lowest one was obtained by applying 3 ton compost/fed under W_1 treatment.

Key words: ***Sandy soil, Compost, Biocomposite, Irrigation regime, bulk density, water regime N, P, K, Fe, Zn, Mn, Cu content, soybean yield*.**

INTRODUCTION

The newly cultivated lands in Egypt are mainly sand and sandy calcareous soils, which are very poor in organic matter and plant nutrients. Different organic fertilizers are established to be involved in the crops fertilization in almost all the world due to their effect on the physical, chemical and biological characteristics of soils (Faiyed *et al*., 1991).

In the recent years, the safe agriculture is one of the main attitudes in the world (El-Kouny, 2002). Also, recently there has been an increasing awareness of the undesirable impact of mineral fertilizers on the environment, as well as the potentially dangerous effects of chemical residues in plant tissues on the health of human and animal consumers.

Composting of agricultural residues by supplying the natural microbial flora present on them with their requirements of inorganic nutrients such as

nitrogen and phosphorus and applying a proper moistening and turning resulted in a final product with high ability to improve soils and enhance plant growth reported by Lampkin (1990). Compost with its content of humic substances and microbial fertilizers, has shown to improve soil physical, chemical and microbiological conditions, moisture content and reduce leaching of nutrients, water run-off and soil erosin (Amin *et al*., 1999).

The improvement for some soil physical parameters was achieved as a result of organic manuring referring to control (El-Sersawy *et al*., 1997). The maximum values of organic matter content, available nitrogen and available phosphorus were resulted by applying compost alone or mixed with biofertilizers to sandy soil (El-Sedfy, 2002; Awad *et al*., 2003 and El-Sedfy *et al*., 2005).

High values of available Fe, Zn, Mn and Cu in sandy soil were obtained with applying organic and bio-organic fertilizers to sandy soil (Abdel Latif and Abdel-Fattah, 1985 and Abas, 2003).

The optimum values of faba bean yield (winter season) and /or peanut yield (summer season) were obtained by applying compost (10 ton/fed) mixed with biofertilizer (El-Sedfy,2002 and Awad *et al*.,2003).

The impact of irrigation frequency (4&8 days intervals on broad bean production in sandy soil indicated that 4-days irrigation intervals gave the maximum yield El-Kommos and Noor El-Din, 1990. A significant increase in water use efficiency at the 1% level, were obtained with decreasing the irrigation level from 100% to 60% of the net irrigation requirements (Tayel *et al*., 1990). On the other hand, 75% of irrigation regime with applied compost realized higher yield of alfalfa than applied one with 50% of irrigation regime (Sabrah *et al*., 1993).

The objective of the present work is to investigate the effect of applied organic fertilizers and irrigation regime on soil nutrient availability and soybean productivity.

MATERIALS AND METHODS

A field experiment was carried out at Ismalia Agric. Exp. Res. Station through the summer season 2005 to study the impact of applied organic fertilizers and irrigation regime on some soil physical propertes as well as soil available macro and micro-nutrients and soybean productivity. The experiment was laid out in a split plot design with four replicates. Irrigation treatments were placed in the main plots, while applied organic fertilizers in the sub plots. Some physical and chemical characteristics of the soil surface under investigation as well as compost and Biocomposite analyses were determined according to Jachson, 1967 and shown in Tables (1:4).

Table 1 – 2

Table (3). Compost analysis.

Analysis	Measurements
Moisture content %	20.53
pH	7.97
EC dS/m	2.60
Density 9g/cm^3)	0.45
Organic matter %	37.62
Organic carbon %	21.15
Total N %	1.12
Total P %	0.27
Total K %	0.36
C/N ratio	18.9
DTPA extractable Fe (ppm)	32.0
DTPA extractable Mn (ppm)	71.0
DTPA extractable Zn (ppm)	36.0
DTPA extractable Cu (ppm)	7.2

Table (4). Biocomposite analysis.

Analysis	Measurements
pH	6.47
Organic carbon %	27.77
Total N %	1.31
C/N ratio	21.2
Total P %	0.36
DTPA extractable Fe (ppm)	104.0
DTPA extractable Mn (ppm)	63.9
DTPA extractable Zn (ppm)	39.5
DTPA extractable Cu (ppm)	8.20
Total count bacteria	14 x 10^7
Total count fungi	14 x 10^6
Total count actinomycets	2.7 x 10^5

The irrigation treatments were started after 21 days of sowing. Theses treatments were:

1- **W_1: Irrigation at 75 % of soil field capacity**
2- **W_2: Irrigation at 50% of soil field capacity**

The organic fertilizers treatments were as follows:

1- **Control (without additions).**
2- **3 ton compost/fed**
3- **4.5 ton compost/fed.**
4- **6 ton compost/fed**
5- **4 ton Biocomposite /fed.**
6- **6 ton Biocomposite /fed.**

Under each of irrigation treatments, the organic fertilizers treatments were randomized and mixed with the soil surface layer (20 cm) by hatchet. Then, the area was planted by soybean (*Ghycine max*, c.v. Giza 25) for one successive growth season (2005) under sprinkler irrigation system.

At harvest time (4 months after sowing) plants of each plot were cut, air dried and seed yield was achieved. Soil sample were taken at the depth of (0-30) from each plot for some physical and chemical analysis

- **Bulk density was determined using the core method. A core of 5 cm diameter and 3 cm in height was used for collecting soil samples.**

The soil samples were oven dried and weighed (Black, 1965) Soil field capacity and wilting point were determined using undisturbed samples from the cores (Black, 1965). Soil samples were analyzed for available N, P, K according to the method described by Dewis and Freitas, 1970. Organic carbon was determined by modified Walkely –Black method (Jackson,1967).

An available Fe, Mn, Zn, and Cu were determined in DTPA-extractable according to Soltanpour and Schwab, 1977).

Analysis of variance was statistically analyzed according to Snedecor and Cochran (1976) using SAS program (SAS Institute, 1982).

RESULTS AND DISCUSSION

1- Some soil physical properties as affected by irrigation regimes and soil applied organic fertilizers:

1-1- Organic matter:

The results in Table (5a) indicated that irrigation regime had no significantly effect on organic matter. However applied organic fertilizers significantly increased the organic matter of the studied sandy soil. Hence, the applied of 6 ton Biocompsite /fed raised the soil organic matter from 0.62% to 0.98% as compared to control treatment, Table (5a).

Table (5a): Organic matter (%) as affected by irrigation regimes and applied organic fertilizers.

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	0.62	0.71	0.74	0.78	0.88	0.85	0.75
W_2	0.61	0.64	0.64	0.80	0.87	1.10	0.78
Average	0.62	0.68	0.69	0.79	0.84	0.98	0.77

L.S.D.0.05 Irrigation treatments = 0.159
Organic fertilizers = 0.033
Irrigation treatments x organic fertilizers = 0.047

This increment may be attributed to the high value of organic matter for Biocompsite, Table (4).

Concerning the effect of interaction between irrigation regime and applied organic fertilizers on soil organic matter, the results indicated that the highly significant increment of organic matter was obtained by irrigation 50% of soil field capacity (W_2) and applied 6 ton Biocomposit / fed, Table (5a)

2. 2. Bulk density:

Data in Table (5b) clear that the highly significant decrease of soil bulk density was achieved under W_2 treatment.

Table (5b): Bulk density (g/cm^3) as affected by irrigation regimes and applied organic fertilizers.

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	1.61	1.59	1.41	1.44	1.54	1.51	1.52
W_2	1.51	1.52	1.48	1.41	1.42	1.40	1.46
Average	1.56	1.56	1.45	1.43	1.48	1.46	1.49

L.S.D.0. 05 — Irrigation treatments = 0.042; Organic fertilizers = 0.010; Irrigation treatments x organic fertilizers = 0.0147

Applied 6 ton compost /fed significantly decreased the soil bulk density values from 1.56 g/cm^3,for control treatment to 1.43 g/cm^3, Table (5b). This decrease may be rendered to increase total prosity and consequently lead to an increase in the apparent volume and decrease in soil bulk density (El-Sedfy *et al*., 2003).

Regarding the effect of interaction between irrigation regime and applied organ fertilizers on the bulk density, the statistical analysis indicated that the highly significant decrease of soil bulk density was achieved by applying 6 ton Biocomposit / fed under W_2 treatment, (Table 5b).

1. 3. Total porosity:

Data in Table (5c) appeared that the trend of total porosity values was contrary to the values of bulk density, in view of the fact, the, increase of total porosity led to decreasing of bulk density. Hence, higher significant increment of total porosity was achieved by W_2 treatment as comparedW_1 treatment, Table (5c). Whenever, the applied 6 ton compost/fed realized the highly significant increment of total porosity Table (5c). These results are in agreement with the finding of Awad, 1989, Ismail *et al*., 2003 and El-Sedfy *et al*., 2003.

Concerning the effect of interaction between irrigation regime and applied organic fertilizers on total porosity, the results indicated that applied 6 ton Biocomposite /fed under W_2 treatment gave the highly significant increment of total porosity, Table (5c).

Table (5c): Total porosity (%) as affected by irrigation regimes and applied organic fertilizers.

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	39.1	40.1	47.2	46.07	41.9	43.0	42.9
W_2	43.0	42.6	44.4	47.20	46.4	47.5	45.2
Average	41.05	41.4	45.8	46.60	44.2	45.3	44.06

L.S.D.0.05 Irrigation treatments = 0.381
Organic fertilizers = 0.095
Irrigation treatments x organic fertilizers = 0.134

1. 4: Available water:

The results in Table (5d) indicated that the highly significant increment of available water was achieved by W_2 treatment. The maximum value of available water was obtained by adding 6 ton compost/fed. This increment may be attributed to apply 6 ton compost/fed enhanced soil moisture at field capacity more pronounced than that of soil moisture at wilting point. Consequently, available water increased.

Concerning the effect of interaction between irrigation regime and applied organic fertilizers on available water, the statistical analysis cleared that the applied 6 ton compost/fed under W2 treatment realized the highly significant increment of available water, Table (5d).

Table (5d): Available water (%) as affected by irrigation regimes and applied organic fertilizers.

Irrigation treatments	Compost			Biocomposit		Control	Average
	3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed		
W_1	7.19	7.82	9.05	7.56	8.34	6.11	7.68
W_2	7.03	7.05	11.06	7.76	8.69	6.56	8.03
Average	7.11	7.44	10.06	7.66	8.52	6.34	7.86

L.S.D.0.05 Irrigation treatments = 0.127
Organic fertilizers = 0.084
Irrigation treatments x organic fertilizers = 0.119

2- Soil available of macro-nutrients as affected by irrigation regimes and organic amendments:

The results in Table (6a, b, c) revealed that more significant increment of available NPK were achieved by addition of 6 ton Biocomposit/fed than addition of 6 ton compost/fed. This increment is due to the Biocomposite contained more pronounced of total NPK concentration than compost, Tables (3and 4). Consequently, more release of nutrients in the available form was resulted in the decomposition of organic matter of applied Biocomposite than applied compost. However,the minimum value of available NP were realized by adding 3 ton compost/fed, Table (6a,b). These

results were corresponding with the results of Awad *et al*. (2003) and El-Sedfy et al (2007).

The statistical analysis appeared that the higher significant increments of available NPK were achieved by W_2 treatment than W_1treatment, Table (6a, b, and c).

Regarding the effect of interaction between irrigation regime and applied organic fertilizers on available NP, highly significant increment of available NP were obtained by applying 6 ton Biocomposit/fed under W_2 treatment, Table (6a, b).

Table (6): Soil available macro-nutrients as affected by irrigation regimes and applied organic fertilizers

a- Available N

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	23.3	26.9	32.0	36.1	34.5	38.2	31.8
W_2	21.1	30.7	34.3	38.2	35.1	42.1	33.9
Average	23.2	28.8	33.1	37.2	34.8	40.1	32.9

L.S.D.0. 05 Irrigation treatments = 1.2706
Organic fertilizers = 0.3934
Irrigation treatments x organic fertilizers = 0.56

a- Available P

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	7.4	14.2	15.2	19.4	15.3	20.2	15.3
W_2	8.3	15.6	16.7	20.1	16.4	21.4	16.4
Average	7.85	14.9	16.0	19.8	15.9	20.8	15.9

L.S.D.0. 05 Irrigation treatments = 0.3177
Organic fertilizers = 0.4833
Irrigation treatments x organic fertilizers = N.S

a- Available K

Irrigation treatments	Control	Compost			Biocomposite		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	49.3	58.4	68.5	77.9	68.4	77.9	66.7
W_2	49.1	68.4	68.8	77.9	68.4	77.9	68.4
Average	49.2	63.4	68.7	77.9	68.4	77.9	67.6

L.S.D.0. 05 Irrigation treatments = 0.3177
Applied organic fertilizers = 0.3141
Irrigation treatments x Applied organic fertilizers = 0.44

3. Soil available micro-nutrients as affected by irrigation regime and applied fertilizers:

Data in Table (7a, b, and c) appeared that the irrigation regime had no significant effect on soil available Fe, Zn and Mn. However higher significant of available Cu was achieved by W_2 than W_1 treatment, Table (7d).

Table (7): Soil available micro-nutrients as affected by irrigation regimes and applied organic fertilizers

a- Available Fe

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	2.16	2.81	3.66	4.75	3.77	4.89	3.67
W_2	2.27	2.95	3.84	5.00	3.96	5.13	3.86
Average	2.22	2.88	3.75	4.88	3.87	5.01	3.77

L.S.D.0. 05 Irrigation treatments = N.S
Organic fertilizers = 0.966
Irrigation treatments x organic fertilizers = N.S

b- Available Zn

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	0.38	0.49	0.64	0.83	0.66	0.85	0.64
W_2	0.40	0.51	0.67	0.87	0.69	0.89	0.67
Average	0.39	0.50	0.66	0.85	0.68	0.87	0.66

L.S.D.0. 05 Irrigation treatments = N.S
Organic fertilizers = 0.0041
Irrigation treatments x organic fertilizers = N.S

c- Available Mn

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	1.30	1.69	2.20	2.86	2.27	2.95	2.21
W_2	1.37	1.77	2.31	3.00	2.38	3.10	2.32
Average	1.34	1.73	2.26	2.93	2.33	3.03	2.27

L.S.D.0. 05 Irrigation treatments = N.S
Organic fertilizers =0.0269
Irrigation treatments x organic fertilizers = N.S

d- Available Cu

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	0.34	0.44	0.57	0.75	0.59	0.77	0.58
W_2	0.36	0.46	0.60	0.79	0.62	0.81	0.61
Average	0.35	0.45	0.59	0.77	0.61	0.79	0.60

L.S.D.0. 05 Irrigation treatments = 0.021
Organic fertilizers =0.0054
Irrigation treatments x organic fertilizers = 0.0078

The results in Table (7a,b,c,d) illustrated that the highly significant increment of available Fe, Zn, Mn and Cu were increased by applying 6 ton Biocomposite/fed, followed by applying 6 ton compost/fed. This increment may be ascribed to higher values of available Fe, Zn, Mn and Cu of Biocomposit than compost, Tables (3, 4).

Inspite of applying 3 ton compost/fed gave the minimum values of available Fe, Zn, Mn and Cu, Table (7a, b, c, d). These results were agreement with those obtained by Abdel-Latif and Abdel-Fattah, 1985 and Abas, 2003.

Concerning the effect of interaction between irrigation regime and applied organic fertilizers on soil available micro-nutrients, the statistical analysis illustrated that no significant effect of that interaction on available Fe, Zn and Mn, Table (7a, b, c). However, highly significant increment of available Cu was achieved by applying 6 ton Biocomposite/fed under W_2 treatment, Table (7d).

4- Soybean seed yield as affected by irrigation regime and applied organic fertilizers:

Data in Table (8) revealed that higher significant increment of soybean seed yield was achieved by W_2 than W_1 treatment. This increment may be due to improve some soil physical properties such total porosity and available water, Table (5c, d).

The highly significant increment of soybean seed yield was obtained by applying 6 to Biocomposit/fed, followed by applying 6 ton compost/fed, Table (8). These high values may be ascribed to increase organic matter and soil available NPK, Tables (5a, 6a, b, and c). While, the minimum value of soybean seed yield achieved by applying 3 ton compost/fed, Table (8).

Regarding the effect of interaction between irrigation regime and applied organic fertilizers on soybean seed yield, the highly significant increment of soybean seed yield was increased by applying 6 ton Biocomposite / fed under W_2 treatment. Although, the lowest one was achieved by applying 3 ton compost/fed under W_1treament, Table (8).

From the obvious results, it could be concluded that adding either 6 ton Biocomposite or 6 ton compost /fed to sandy soil and irrigation at 50% of soil field capacity in order to improve some soil physical properties and to maximize the soil availability of macronutrients and consequently soybean productivity.

Table (8): Seed yield of soybean (kg/fed) as affected by irrigation regimes and applied organic fertilizers

Irrigation treatments	Control	Compost			Biocomposit		Average
		3.0 ton/fed	4.5 ton/fed	6.0 ton/fed	4.0 ton/fed	6.0 ton/fed	
W_1	425.25	586.25	640.50	691.25	625.63	708.75	612.94
W_2	519.75	625.63	664.13	743.75	660.63	905.63	686.59
Average	472.50	605.94	652.32	717.5	643.13	807.19	649.77

L.S.D.0.05 Irrigation treatments = 25.83
Organic fertilizers = 15.41
Irrigation treatments x organic fertilizers = 21.77

REFERENCES

Abas, Faten, A. (2003). Effect of some soil conditioners on fertility and productivity of sandy soil. Thesis, M.Sc. Faculty of Agric., Moshtohor, Zagazig University, Benha Branch.

Abdel Latif, I. A. and K. S. Abdel-Fattah (1985). Extraction of available micro-nutrients from calcareous soils amended with organic fertilizers Egypt. J. Soil Sci.25,183-190.

Amin, G. A., M. H. Mostafa, A. A. Amer and I. R. Refae (1999). Potential microorganisms for rapid and nutritionally enriched compost. Proc. of 1st Cong. on Recent Technology; i.e. in Agric., Cairo Univ, Faculty of Agric., Egypt, Nov.27-29, Vol.IV:804-822

Awad, Y. H. (1989). Effect of some soil improvement techniques on physical properties of sandy and calcareous soil. Ph.D.Thesis, Fac. of Agric. Al-Azhar.Univ.

Awad, Y. H., H. A. Ahmed and O. F. El-Sedfy (2003). Some chemical properties and NPK availability of sandy soil and yield productivity as affected by some soil organic amendments. Egypt. J. Appl. Sci., 18(2): 356-365.

Black, C. A. (1965). Methods of Soil Analysis. Part.I. Am.Soc. Agron., Madison Wisconsim

Dewis, J. and F. Freitas (1970). Physical and chemical methods of soil and water analysis. Food and Agriculture organization of the United Nations, Rome.

El-Kommos, F. and Noor El-Din (1990). The effect of irrigation frequency under varying soil amendments applicationon on wheat and broad beans production in sandy soils. Egypt. J. Soil Sci. 30,pp403-414.

El-Kouny, H.M. (2002). Effect of organic fertilizer in different application rates under salinity stress Goudvion on soil and plant. International Symposium and Optimum Resources Utilization in salt affected soil. Ecosy stems in 4rid 1 and Semi-arid Regions, 8-11 April2002, Cairo-Egypt, Le Meridian Helioplis Hotel, Abst. Book,pp-33.

El-Sedfy, O. F. (2002). Effect of bentonite, compost and biofertilizers additions on some physical properties of sandy soil and wheat and peanut yields. J. Agric. Sci. Mansoura Univ., 27(10): 7117-7126.

El-Sedfy, O. F., A. M. M. Biomy and A. A. Badawy (2005). Response of maize to Bio, organic and nitrogen fertilization in sandy soil. Egypt. J. of Appl. Sci., 20(11):269-284.

El-Sedfy, O.F., W. M. El-Farghal and A. A. Badawy (2007). Impact of applying different sources of N-fertilization on soil availability of macronutrients and wheat yield. Minufiya J. Agric. Res., 32(2):503-524.

El-Sedfy, O. M. F., A. Sh. A. Osman, E. M. Gaafar and Y. H. Awad (2003). Residual effect of different organic fertilizers on some physical properties of sandy soil production and nutrient content of Egyptian clover. J. Agric. Sci. Mansoura Univ., 28(8):6505-6515.

El-Sesawy, M. M., Bouthaina F. Abd El-Ghany, K. W. Khalil and S. Y. Awadalla (1997). Interaction between organic manure mixtures applied N-level and biofertilization on calcareous soil properties and wheat production in Wadi Suder, South Sinai. Egypt. J. Soil Sci.37(3):367-397.

Faiyed, M. N., M. M. Shehata and S. W. Barsoom (1991). Response of faba bean grown on sandy soil to organic and inorganic nitrogen fertilization. Egypt. J. Soil Sci., 31(3):pp.343-355.

Ismail, A. B., H. A. Ahmed and E. M. Gaafar (2003). Some soil properties and soyabean productivity as affected by organic amendments and irrigation regime in sandy soil. Egypt. J. Appl. Sci., 18(3B):653-663.

Jackson, M. L. (1967). 'Soil chemical Analysis" Prentice Hall of India Private Limited, New Delhi

Lampkin, N. (1990). Organic Farming. Farming press book, United Kingdom, p.63.

Sabrah, R. E. A., M. F.Ghaneim, R. K. Rabie and H. M. Magid (1993). Effect of soil conditioners and irrigation regime on the growth and nutrient uptake by Alfalf plants. Egypt. J. Soil Sci. 33, pp.73-84.

SAS Institute (1982). SAS User's guide: Statistics. SAS Institute Inc., Raleigh, NC, pp.84

Snedecor, G. W. and W. G. Cochran (1976). Statistical Methods 6th ed., Iowa State Univ. Press, Iowa, USA.

Soltanpour, P. N. and A. R. Schwab(1977). A new soil test for simultaneous extraction of macronutrients and micronutrients in alkaline soils. Commun. Soil Sci. Plant Anal.8:195-207.

Tayel, M. Y., M. A., Matyn and S. A. Wahba, (1990). Effect of irrigation treatments and plant rows per drip line on broad (*Vicia faba*) plant. Egypt. J. Soil Sci. 30,No.1-2.pp.259-277.

أثر إضافة الاسمدة العضوية ومعاملات الرى على تيسر العناصر الغذائية وانتاجية فول الصويا

اسامة محمد فتحى الصدفى

معهد بحوث الاراضى والمياه والبيئة- مركز البحوث الزراعية-جيزة-مصر

الملخص العربي

أقيمت تجربة حقلية فى محطة البحوث الزراعية بالاسماعيلية خلال الموسم الصيفى ٢٠٠٥ لدراسة أثر اضافة المواد العضوية ومعاملات الرى على بعض خواص الارض الطبيعية وتيسر العناصر الغذائية الصغرى والكبرى وكذلك انتاجية فول الصويا. وصممت التجربة بنظام القطع المنشقة مرة واحدة فى وجود أربعة مكررات. وكانت معاملات الرى تمثل الوحدة الرئيسية للتجربة بينما المواد العضوية المضافة تمثل الوحدة التحت الرئيسية للتجربة.

وكانت معاملات الرى على النحو التالى:-

١- W_1 : الرى عند ٧٥% من السعة الحقلية للتربة.

٢- W_2: الرى عند ٥٠ % من السعة الحقلية للتربة.

بينما كانت معاملات المواد العضوية على النحو التالى:

١- كنترول (بدون اضافات) ٢- ٣طن كمبوست/فدان

٣- ٤.٥ طن كمبوست/فدان ٤- ٦ طن كمبوست/فدان

٥- ٤ طن بيوكمبوسيت / فدان ٦- ٦ طن بيوكمبوسيت/فدان

وكانت أهم النتائج المتحصل عليها على النحو التالى:-

- كانت أعلى زيادة معنوية فى المسامية الكلية ، الماء الميسر، النتروجين الميسر ، الفوسفور الميسر ، البوتاسيوم أمكن الحصول عليها عند استخدام معاملة الرى(٥٠% من السعة الحقلية) W_2 بينما لم يكن لمعاملات الرى تأثير معنوى على تيسر العناصر الصغرى قيما عدا النحاس.

- وجد ان اضافة ٦ طن بيوكمبوست/فدان أعطت أعلى قيمة للمادة العضوية بينما أعلى زيادة معنوية فى المسامية الكلية والماء الميسر أمكن الحصول عليها باضافة ٦ طن كمبوست/فدان

- اضافة ٦ طن بيو كمبوستت / فدان أعطت أعلى زيادة معنوية فى تيسر كل من النتروجين ، الفوسفور ا ، البوتاسيوم ، الحديد ، الزنك ر، المنجنيز النحاس.

- أظهرت النتائج زيادة محصول الحبوب فى فول الصويا باضافة ٦ طن بيو كمبوست/فدان تحت معاملة الرى W_2(٥٠% من السعة الحقلية) بينما أقل محصول أمكن الحصول علية باضافة ٣ طن كمبوست/فدان تحت معاملة الرى W_1 (٧٥% من السعة الحقلية).

Table (1): Mechanical and chemical analyses of the studied initial soil.

Particle size distribution							pH	EC	SP	Soluble ions (me/l)							
Coarse sand %	Fine sand%	Silt %	Clay %	Texture	$CaCO_3$ %	O.M %	(1:2.5)	dSm^{-1}	%	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$
73.61	15.25	0.34	10.82	Sand	0.28	0.40	8.04	0.39	20	0.24	0.32	2.62	0.24	-	0.21	0.32	2.89

Table (2): Some physical properties, O.M% and soil available macro and micronutrients of the studied initial soil.

B.d* g/cm^3	T.P** %	Available water%	O.M %	Avail. N (ppm)	Avail. P (ppm)	Avail. K (ppm)	Avail. Fe (ppm)	Avail. Zn (ppm)	Avail. Mn (ppm)	Avail. Cu (ppm)
1.61	39.1	5.71	0.56	15.0	6.7	49.1	2.06	0.36	1.24	0.32

*** B.d: Bulk density**
**** T.P: Total porosity**