J.Soil Sci. and Agric. Eng., Mansoura Univ., Vol. 10 (3): 147 – 155, 2019

Improvement of Egyptian Clover Yield and Quality by Using Bio and Organic Fertilizers in Newly Cultivated Saline Soil

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ABSTRACT

This work was performed at Sahl El-Hossinia Agric. Res. Station, El-Sharkia, Governorate, throughout winter seasons of the year 2016/2017 and 2017/2018 to investigate the foliar application of compost tea humic acid, and bio-fertilizer on forage production, seeds, chemical analysis of plant and soil. Using bio-fertilizer; humic and compost tea on plant increases significantly the clover yield. Humic acid recorded that increased of values for yield, yield components and quality as compared by other treatments. Results pointed that forage yield was affected by whole treatments under saline soil conditions. In general, berseem clover treated with humic acid increased the plant height, fresh, dry yield, seeds yield, weight of 1000 seeds, crude protein, fiber fraction, Total carbohydrate, digestible crude protein of forage yield as compared with control. Values of EC and pH of soil were decline due to various traits using foliar application, while the highest rate of EC in soil run to (5.72 dsm^{-1}) at bio-fertilizer. Values of soil properties treated by whole traits were slightly low comparing control (7.72 dsm^{-1}). It is clear that the minimum total costs were those of application of Bio-fertilizer, being 4570 L.E and the maximum total costs were those of the plants received Compost-t rate which was 5180 L.E. Average over all treatments of total costs were 4847.5 L.E for the two season. The highest value of net return per one invested L.E was achieved when using humic acid (5.40 L.E) and Compost-t (4.15 L.E) compared with N fertilization (control 2.63 L.E).

Keywords: Egyptian clover, saline soil, organic and bio-fertilizer and economic evaluation

INTRODUCTION

Egyptian clover is one of keeping the soil, prevents wind and increases soil organic matter content, particularly in newly reclaimed lands and enhancing soil structure and chemical and physical feature, (Graves *et al* 1996 and El-Nahrawy 2005). Thus, there is a need to develop barseem clover cultivar and appropriate fertilizer types for high forage production and good quality. In Egypt clover (*Trifolium alexandrinum* L.) is considered long winter forage legume. Its cultivated area almost accumulates more than 1.25 million fed of the total area of around 7.5 million fed. Leguminous crop with high yield and nutritive value, berseem has become one of the basic entries of successive crops in irrigated soils or as a green manure in cash crop rotations Kuneluis Also (1997). Berseem is an annual clover cultivated in irrigated subtropical regions and used as fodder for cattle and milk buffalo. Berseem is significant winter crop in ancient Egypt and was introduced into northern India in nineteenth century. In addition, grown in Europe and the United States (Heuzé *et al* 2016). Berseem clover is a fast growing, boosting forage quality that is mainly cut and fed as green forage. It is frequently compared to alfalfa, due to its comparable feed value. It is lowest drought-resistant however, it's better on high moisture and alkaline soils. Moreover, berseem sown in nearby Autumn and provide feed before and through colder months Suttie (1999). It is highly productive when temperatures rise after winter (Hannawy and larson 2004 and Suttie 1999). Seeds are massive under favorable conditions. Grazing is possible though less common than cutting. Berseem can be used as green manure (Hannawy and Larson 2004). Humic acid are a fraction of humic substances composed of a long chain molecule, which is high in molecular weight, black colour and soluble in an alkaline solutions. It is consisting from the organic components of soil, humus, peat and coal. It is a byproduct of microorganisms that break down dead organic matter.

They were actually a complex mixture of many different organic acids formed through the biodegradation of organic matter (Sebastiano *et al* 2005) illustrated that humic acid had a significant impact on growth plant, yield, seed yield, quality and photosynthetic metabolism of wheat crops. Foliar application of humic acid caused a transitional production of plant dry mass with added to control and split soil nitrogen application. (Hussein and Hassan 2011) found that humic acids are vital soil contents; as they can enhance chemical and physical soil features. Organic matter is administrators to arise water holding capacity of the soil, (Vengadaramana and Jashothan 2012). (Singaroval *et al* 1993) proved that the increase in dry matter production with humic acid might be due to its directly on plant growth axing activity, applied to increase in the dry matter. (Nordi *et al* 1999) exhibited the biological activity on the humic acid was refer to chemical texture and functional set, which could react with harmonic- binding proteins in the membrane system, evoking a hormone like response. Humic acid content after mineral fertilization was increased to 50 % as compared to control and three times higher with manure application.

Compost-T may be containing that plant growing regulator like substances which contribute to better plant growth and yield Pant *et al* (2011). Overwhelmingly, compost tea is mixed with boost which is added with a view of rising microbial population through production (Scheuerell and Mahaffee 2004). The use of composts for the maintenance of plant health has been central to the modern organic agriculture movement dating back to the early 1900s Heckman (2006). Over the past century, a result illustrated that composts can suppress plant diseases caused by a variety of pathogens; as well as highest variability of suppression precludes their commercial use for biologically-based disease management in convey by (Hoitink and Fahy 1986; Litterick *et al* 2004; and Simsek *et al* 2011). Implementation of compost and bio-fertilizer with influence bed sowing process boosting soil physical characters and wheat yield in saline soils revealed by (Shaban *et al* 2013). (Tandon, 2000 and Nasef *et al* 2009) who's that physical characterizes (hydraulic conductivity, bulk density and overall porosity) of salt influenced a soil enhanced when applied are compost, compost tea and bio-fertilizer. On the other hand, presents that the addition of compost (organic) to agricultural in soils has useful impacts on crop planted and yields by enhancing soil physical and biological characterizes (Zheljazkov and Warman 2004). Regions of Mediterranean in the arid and semi-arid, who formed the soil salinization and drought stress mainly which are characterized by high evapotranspiration rates and low rainfall. In these areas, the salts are very low; therefore, salt accumulates in soil surface layers. Since high salts content may adversely affect in soil characters and crop yields, food security could be limited according to (Mariangela and Francesco 2015).

Therefore, salt affected soils must be reclaimed to effect of good maintain satisfactory levels of fertility for sustaining food production. The aim of current investigation was to study the effects of foliar application on Berseem with bio-fertilizer, compost tea and humic acid compared with the control nitrogen fertilizer on some character of quantity and quality for plant, seed yield and physical and chemical characterizes for soil under status of saline soil.

MATERIALS AND METHODS

The current investigation was carried out during winter seasons of 2016/2017 and 2017/2018 at Sahl El-Hossinia Agricultural Research Station in El-Sharkia, Governorate, Egypt. The substantial objective of experiment was to study the effect of treatments application (foliar) of organic acid (compost - tea, humic acid) and bio-fertilizer on physical and chemical soil characterizes, quantity and quality of Egyptian clover (*Trifolium alexandrinum* L.) under saline soil conditions. Berseem clover (*Trifolium alexandrinum* L.) c.v. Helaly was supplement from Forage Crops Research Department, Field Crops Research Institute, Agricultural Research Center, Giza, Egypt. Bio-fertilizer, compost tea and humic acid were applied as foliar on plants for three times after 30, 55 and 75 days from sowing. Experimental plots were sown on 10th and 15th October in 2016/ 2017 and 2017/2018. The plot size was 10 m^2 (5 m long and 2 m width). Clover seeds were sown 20 kg/fed. The experiments were used a randomized complete block design (RCBD) with three replications. Soil samples: Soil samples were taken before planting and ground 0.5 g powder of each was digested by concentrated digestion mixture of H_2SO_4/$HClO_4$ acids according to (Sommers and Nelson 1972). The surface layer (0-30 cm) have been obtained from the experimental region, air dried, and ground, sieved by 2 mm sieve and analyzed for physical and chemical characteristics as given before planting Table (1). After harvest disturbed and undisturbed samples have been collected from surface layers and sub-surface layers at soil depths of 0-30, 30-60 and 60-90 cm. for whole plots through both seasons. The soil samples were air dried and analyzed for physical and chemical properties, according to (Page *et al* 1982). Total soluble salts were fixed by using electrical conductivity meter at 25°C in soil paste extract as dSm^{-1} Jackson (1976). Total nitrogen was determined by using micro kjeldahel (digestion /distillation unit) according to Jackson (1976). Phosphorus was determined Spectrophotometrcally using ammonium molybedate / stannous chloride method according to Chapman and Pratt (1978). Potassium was set by a flame photometer, according to (Page *et al* 1982). Fe, Mn, and Zn were fixed by using atomic absorption (model GBC 932).

Table 1. Some physical and chemical data at the depth of 0-30 cm of the experimental soil before planting

Course sand (%)	Fine sand (%)	Silt (%)	Clay (%)	Soil Texture	OM (%)		$CaCO_3$ (%)	
5.37	23.98	34.49	36.25	Clay Loam	0.59		7.94	
pH	EC	Cations meq l^{-1}				Anions meq l^{-1}		
(1:2.5)	(dSm^{-1})	Ca^{++}	Mg^{++}	Na^+	K^+	HCO_3^-	Cl^-	SO_4^{--}
8.07	10.43	9.87	17.54	76.10	0.79	7.66	65.18	31.47
Available Macro - nutrients mg kg^{-1}			Available Micro - nutrients mg kg^{-1}					
N	P	K	Fe	Mn		Zn		
37.49	3.69	189	2.61	1.53		0.56		

Bio-fertilization content: Seed treatment using bio-fertilizer the symbiotic N-fixing bacteria of Rhizobium leguminosarum bio-vartrifolii (mixture of two isolated Arc 102 and Arc 103) by the Soil Microbiology Unit in soil which provided, Water and Environment Research Institute Agricultural Research Center, Giza, Egypt. Compost analyses: Compost-t was fit by soaking 1 m^3 from compost in 1000 L water, for 48 hrs then filtered and the leached was used as compost-tea and chemical analyses used is shown in Table (2). The compost tea analyses were done according by (Brunner and Wasmer 1978). Compost-tea is given by Soil Microbiology Unit at Soils Water and Environment Research Institute Agricultural Research Center, Giza, Egypt.

Table 2. Compost-tea analysis

EC (dSm^{-1}) (1:10)	pH (1:2.5)	C	O.M	C/N	N	P	K	Fe	Mn	Zn
			(%)			Available (%)			Available ($mgkg^{-1}$)	
2.77	7.40	21.9	47.00	10.23	2.14	0.63	2.28	137	88	59

Humic acid analyses: Humic acid analyses are an effective agent to determine the carbon, N, P, K, Organic carbon and organic matter as described by Jackson (1967). Fe, Mn, and Zn were determined by using Atomic Absorption (model GBC 932), according (Cottenie *et al* 1961) as Chemical characters' of the humic acid substance in Table (3). This does the Soil Microbiology Unit at Soils, Water and Environment Res. Inst. Agric. Res. Center Giza, Egypt.

Table 3. Chemical characters of the humic acid

pH	EC (dSm^{-1})	O.M. (%)	Macronutrients (%)			Micronutrients ($mgkg^{-1}$)		
			N	P	K	Fe	Mn	Zn
7.64	2.97	72.02	1.97	0.35	3.40	397	249	32.19

Plots were assigned for spraying with the experimental treatments, where:

- (T1) the recommended treatment of inorganic NPK (Control)
- (T2) bio-fertilization (Rhizobium inoculation)
- (T3) compost tea at a rate 400 L water/fed. (As Foliar)
- (T4) humic acids at a rate 2 L humic acid/400 L water/fed. (As foliar)

Urea (46 % N) was the source of mineral nitrogen fertilizer, which was applied of rate 60 kg N/fed three times 25, 50 and 70 days from sowing at same doses. Super Phosphate was added through soil tillage at 200 Kg/fed (15.5% P_2O_5). Potassium sulphate (48 % K_2O) was added at 65 kg/fed twice 25 and 50 days.

Plant analyses:

In each season three cuts were collected. The first cut was taken 60 days after sowing; the rest cuts were taken every 30 days after the first cut. Samples of each cut of both seasons were collected to determine: length of main stem from soil surface to stem tip; plant height (cm), fresh yield (ton/fed) and dry yield (ton/fed), percentage of DM.

Dry yield = Fresh yield × Dry matter %

Biological yield was recorded by harvesting the whole plot and then converted into ton/fed. Seed yield was obtained after harvested from heads after air dried. Weight of thousands seed and weight seeds yield (kg/fed). In each cut for the second season, some chemical parameters were determined, i.e., Crude protein (CP %) was fixed by multiplying the total nitrogen percentage, Total carbohydrate (TC %) and fiber fraction (ADF, NDF, ADL) percentage according to A.O.A.C. (1990). Digestible crude protein (DCP %) according to (Mc-Donald *et al* 1978).

Economic evaluation:

In the present study, the economic evaluation included three parameters that were estimates as follows:

- Average variables as well as total costs of experiment.
- Net farm revenue is the ratios of forage Egyptian clover production particularly to the actual marketing price.
- Net farm return of forage Egyptian clover production. It is the difference between value of forage yield according to the actual price and the total costs.

Statistical analysis: All data were subjected to the statistical analyzed of variance and means were according to procedures outlined by (Gomez and Gomez 1984) using MSTAT-C computer software package (1990). Mean comparisons were made with an F-protected LSD at P<0.05. Bartlett's tests were done to detect homogeneity of the errors variance. The test was insignificant for all treatments, thus combined analysis across two years was by all studied of treatments.

RESULTS AND DISCUSSION

Effect of different treatment on growth characters and chemical constituents:

I-Growth characters:

1-Plant height (cm): results in Table (4) depict that plant height was affected by bio–fertilizer, compost–t and humic acid, respectively for the two seasons and its combined analysis. The treatment humic acid was the best one where it gave highest mean values (86.83, 85.52 and 86.18 cm) in the two seasons and it's combined, respectively. (Sebastiano *et al* 2005) showed that humic acid significantly effect on growth, seed yield, quality and photosynthetic metabolic of wheat. These results are harmony with those obtained by (Scheuerell and Mahaffee 2004) illustrated that humic acid (HA) suspensions based potassium humate which have been applied successfully in numerous area of plant production as a plant growth incentive or soil conditioner for improvement natural resistance against plant diseases. Reports had shown that efficiency of humic acid reducing some plant diseases, (Yigit and Dikilitas 2008).

Table 4. Effect of organic (compost-t and humic acid) and bio-fertilization on plant height (cm) of Egyptian clover in 2016/17 and 2017/18 and their combined

Treat.	Season I			
	Cut I	Cut II	Cut III	Mean
Control	69.77	69.77	65.28	68.28
Bio-fertilizer	85.53	85.53	82.54	84.54
Compost-T	78.90	82.60	79.72	80.50
Humic acid	86.87	88.98	84.64	86.83
LSD 0.05	1.32	2.10	2.31	3.62
Treat.	Season II			
	Cut I	Cut II	Cut III	Mean
Control	68.49	70.35	65.81	68.22
Bio-fertilizer	80.72	84.16	79.15	81.34
Compost–T	77.82	83.55	78.24	79. 87
Humic acid	85.50	87.32	83.73	85.52
LSD 0.05	2.31	2.91	3.41	1.41
Treat.	Comb.			
	Cut I	Cut II	Cut III	Mean
Control	69.13	67.53	65.55	67.29
Bio-fertilizer	83.13	84.85	80.85	82.94
Compost – T	78.36	83.08	78.98	80.11
Humic acid	86.19	88.15	84.19	86.18
LSD 0.05	4.21	3.46	3.11	2.26

2- Fresh and dry yield: Results in date from Table (5) found that values of fresh and dry yield in barssem clover were affected by different application of organic acid and bio-fertilizers, where the arranged was from 34.37 to 30.16 and from 26.65 to 23.49 and 6.08 to 5.22 and 2.79 to 2.35 ton fed^{-1} for the first, second seasons and combined, respectively. The application, of organic and bio-fertilizer with respected, it was observed that values of fresh and dry weight affected by different treatment, wherever the addition of bio-fertilizer recorded the lowest values of both fresh and dry yield than the other treatment. Mostly, using humic acid were increased in fresh and dry weight by compared with the control, followed by the compost–t and bio–fertilizer, resp., this results are in harmony with those obtained by (Hussein and Hasan 2011). Referencing the cuts of berseem clover in data appeared that fresh and dry yield rates were excess in 2^{nd} cut as compared with different cuts. These results are confirmed by Abdel

Gawad (2003) and (Abotaleb *et al* 2008) noticed that highest fresh yield of barseem was obtained from the second and/or the third cut at 8-12 weeks after planting, where the environmental conditions prevailed during that period were optimum for berseem growth and production by (Khaled *et al* 2011) proved that better growth was due to boost soil nutrient availability and uptake by plants organic manure substantially enhance shoot and root dry weights influenced by the application of various organic materials composted. Mohamed and Ashok (2014) illustrated that total dry matter of sorghum was highly significant. Highest DM yield was produced in treatment where Compost of Farm Yard Manure (FYM), humic acid and press mud were applied in combination followed by the traits where some soil properties (SSP) and compost of FYM were applied

3-Seed Yield: Data in Table (6) shown that weight of seeds yield (kg fed^{-1}) and weight of 1000 seeds (g) was affected by bio–fertilizer, compost–t and humic acid, respectively for the combined over the two seasons. The result mean values for weight of seeds were (273, 256, 238 and 199 kg fed^{-1}), respectively for humic acid, compost–t, bio–fertilizer and control, while weight of 1000 seeds (g) were recorded the highest mean value 2.38 g in humic acid treatment. (Ferrara and Brunetti 2010) exhibited that humic acid is most active component of soil organic matter and shown to have a hormone like activity which boosts growth. Application of humic acid was effect significantly on plant growth parameters sown in saline condition, indicated that by (Turkmen *et al* 2005).

Positive results may be to humic acid as applied it has a promoting effect on plant parameters under saline soil. (Boris *et al* 2010) found that humic acid attributes were influenced on growth and physiological characters and their effects may depend on hormones and development.

Table 5. Effect of organic (Compost-T and humic acid) and bio-fertilization of fresh and dry yields of berseem clover in 2016/17 and 2017/18 and their comb

Treat.	Fresh yield (ton /fed)											
	Season I				Season II				Comb.			
	Cut I	Cut II	Cut III	Total	Cut I	Cut II	Cut III	Total	Cut I	Cut II	Cut III	Total
Control	8.92	9.55	8.19	26.65	7.80	8.25	7.44	23.49	8.36	8.90	8.16	25.42
Bio-fertilizer	9.72	10.24	9.22	29.17	8.92	9.13	8.67	26.72	9.32	9.69	8.95	28.33
Compost–T	10.64	11.34	9.71	31.69	9.28	9.91	9.16	28.35	9.96	10.63	9.44	30.03
Humic acid	11.41	12.16	10.80	34.37	9.98	10.54	9.64	30.16	10.70	11.35	10.22	32.27
LSD 0.05	0.65	0.63	0.89	2.04	0.76	0.61	0.91	1.54	0.63	1.10	0.85	2.50
Treat.	Dry yield (ton/ fed)											
	Season I				Season II				Comb.			
	Cut I	Cut II	Cut III	Total	Cut I	Cut II	Cut III	Total	Cut I	Cut II	Cut III	Total
Control	0.88	1.01	0.90	2.79	0.74	0.92	0.69	2.35	0.81	0.97	0.80	2.58
Bio-fertilizer	1.12	1.86	1.45	4.43	1.49	1.85	1.06	4.40	1.31	1.86	1.26	4.43
Compost–T	1.15	1.89	1.72	4.76	1.64	1.91	1.17	4.72	1.40	1.90	1.45	4.75
Humic acid	2.01	2.17	1.90	6.08	1.90	2.14	1.17	5.22	1.96	2.16	1.54	5.66
LSD 0.05	0.19	0.21	0.33	0.48	0.22	0.14	0.31	0.29	0.20	0.11	0.10	0.16

Table 6. Impact of compost-T, humic acid and bio-fertilization on weight of 1000 seed and seed yield of Egyptian clover in 2016/17 and 2017/18 as well as combined

Treat.	Weight of 1000 seeds (g)		
	First season	Second season	Comb.
Control	2.25	2.29	2.27
Bio-fertilizer	2.31	2.34	2.33
Compost-T	2.33	2.36	2.35
Humic acid	2.35	2.41	2.38
LSD 0.05	NS	NS	NS
Treat.	Seeds yield (kg /fed)		
	First season	Second season	Comb.
Control	198	200	199
Bio-fertilizer	245	230	238
Compost-T	253	259	256
Humic acid	269	277	273
LSD 0.05	21.43	19.03	23.19

II – Chemical constituents:

The effect of organic acid and bio-fertilizer on the crude protein content is presented in Table (7), Egyptian clover treated by control, compost, bio-fertilizer and humic acid accumulated the values CP ranged from 14.68 to 19.05 % and the treatment which used humic acid gave the highest value 19.05% while the treatment which used compost–t gave the lowest ratio 14.68%. Berseem clover was superior in the CP content with humic acid fertilizer, while the same treatment recorded the lowest value with total carbohydrate and fiber fractions (Waldo and Jorgensen 1981). The researcher suggests conducting animal feeding trials to investigate the response of ruminants to the forage with organic acid especially humic acid. Total carbohydrate content was recorded the lowest value with humic acid fertilizer of the berseem clover, equivalent to 60.46 % when nitrogen fertilizer was applied. Forage legumes are recognized to have higher crude protein and cell wall fractions, however, lower total carbohydrates.

The lowest values of total carbohydrate content amounting 60.46 % when humic acid was applied. Forage legumes are known to have higher protein and cell wall fractions, however, lower contents of carbohydrate. Nor El-Din (1978) showed that crude protein were higher in humic acid followed bio-fertilizer than other treatments in the second seasons. Values of digestible crude protein recorded the highest value for digestible in treatment humic acid followed; bio-fertilizer 13.69, 12.58 % respectively. The data presented in Table (7) indicated that low significant NDF and ADF contents were produced from humic acid. The ADL content gave the lowest value with humic acid treatment followed; compost–t and bio-fertilizer. Forage legumes are generally higher in lignin, results by Laidlaw and Teuber (2001).

Table 7. Effect of organic (compost-t and humic acid) and bio-fertilization of chemical constituents' percentage and fiber fraction of Egyptian clover (combined analysis)

Treat.	CP %	TC %	DCP %	ADF (g/kg)	NDF(g/kg)	ADL (g/kg)
Control	15.25	78.08	10.23	315.47	465.49	40.90
Bio-fertilizer	17.83	76.90	12.58	296.38	426.48	39.20
Compost–T	14.68	71.18	9.71	276.63	423.35	38.29
Humic acid	19.05	60.46	13.69	272.04	399.16	37.10
LSD 0.05	0.53	1.10	1.00	4.23	2.99	0.89

Effect of different treatments on soil physical and chemical characters' of experimental site after clover harvest:

1- Electric conductively (E.C. dSm^{-1}):

Table (8) presents soil EC were decline due to application of whole treatments compared with control N fertilizer using foliar application in the experimental plot units, while application of compost on salt affected soil helps in diminishing salinity and improving soil characteristics, mainly by the increase of salts leaching. The highest mean value of EC in soil gave (5.72dSm^{-1}) in case comb. of bio-fertilizer than other treatments of fertilizer. These results are agreement and reported by (Abdurrahman *et al* 2004) and (Hussein and Hassan 2011) observed the mean values of EC in soil can be arranged according on the other hand to the following order; humic acid, bio-fertilizer, compost-tea and control of foliar applied.

Table 8. EC (dSm^{-1}) and pH available in soil after clover harvest (average of the two seasons and comb.)

Treat.	EC (dSm^{-1})			pH		
	Season I	Season II	Comb.	Season I	Season II	Comb.
Control	8.10	7.34	7.72	8.09	8.05	8.07
Bio-fertilizer	5.87	5.57	5.72	7.95	7.93	7.94
Compost–T	5.21	4.33	4.77	7.98	7.95	7.97
Humic acid	5.98	5.29	5.64	7.94	7.95	7.95

2- pH available in Soil:

The one of most important parameters is soil pH, which overall changes in soil chemical characters. Data Table (8) shown that soil pH was declined slightly due to application of humic acid, bio-fertilizer, and compost-tea as compared with other applied of fertilization. Compost fertilizer extracts were recorded decreased of pH, salinity (EC, for lower dilutions) and K concentration, while raised slightly N, P, Ca, and Mg concentrations when used as a source of nutrients for plant growth. Rebeka (2006) obtained those results found that the same. Soil pH slight was declined values may be reflect the activity of micro-organisms in decomposing OM and releasing organic acids. Addition of compost and different mineral nitrogen fertilizer rates, slightly were decreased the pH values in tested soil, reported that result by Gehan (2006).

3 - Macro-Micronutrients content available in soil after clover harvest:

Available (NPK) and (Fe, Mn and Zn) mg/kg in soil. Data in Table (9a-9b) revealed that the values of macro and micronutrients content of available in soil after clover harvest (N, P, K, Fe, Mn and Zn) mg/kg in soil amounts were increased significantly by different the others treatment, results indicated that available P and K affected by compost-T addition. Data found that the highest values of macro-micronutrient follow this order; compost tea, bio–fertilizer, humic acid with foliar applied compared to control treatment, respectively. Observed that using of composted manure (50 kg N /fed). Inoculation reveled higher values of N, P and K uptake than the full does (100kg N/fed.) of no organic N-fertilizer or organic manure, obtained that results by El-Sebaey (2006). On other hand of similar these result about (Samah and Bashandy 2007), revealed that N, P, K uptake of crops sown in compost was higher than of crops grown on the untreated soils. Regarded to application treatments, the results demonstrated that potassium by plants increased by various addition treatments of organic alone or combined with other fertilizer, the compost-t addition treatment was gave highly significantly values of macronutrients compared with other treatments.These results according with that gained by Holah (1990), Mekail (2006) and (Mostafa *et al* 2001) evident that the applied using of organic manures concrete was evolution available of Fe, Mn and Zn contents. The lowest values of Fe, Mn and Zn were observed in case of control N fertilizer foliar application, the results showed that Iron by plants increased by different addition treatments of organic acid or join with other fertilizers, the compost-t addition treatment were highly significant of micronutrients compared with other treatments. As for as, data that the potassium in plant was significantly, as affected by using organic only or combined with other fertilizers, which are ranges of the potassium from 214 to 203 (mg/kg). As for Iron in plant, data revealed that Iron was highly significant as affected by using organic only or combined with other treatments, where are ranges of the Iron from 2.86 to 2.73 (mg / kg plant). (El- Sedfy *et al* 2005) and (Modaihsh *et al* 2005) pointed that application of compost at levels increment available Zn and organic matter when applied at 5 tons compost–t in soil overtake the organic matter content from 0.48% to 0.58%. (Hammad *et al* 2006) found that combination of rice straw compost in addition nitrogen fertilizer raising availability of Fe, Mn and Zn in tested soil. (Abdel–Aal *et al* 2003) reported that the same conclusion when setting the same treatment addition.

Table 9a. Effect of foliar application with some aliment available NPK in soil mg/kg concentration in soil after harvest clover plants during 2016/17 and 2017/18 seasons and their combined

Treat.	N (mg /kg)			P (mg /kg)			K (mg /kg)		
	Season I	Season II	Comb.	Season I	Season II	Comb.	Season I	Season II	Comb.
Control	40.88	41.58	41.23	3.69	4.06	3.98	195	198	196.0
Bio-fertilizer	42.79	43.12	42.96	4.06	4.18	4.12	203	196	199.5
Compost–t	43.62	43.97	43.80	4.13	4.28	4.21	214	214	214.0
Humic acid	42.74	43.68	43.21	4.02	4.10	4.06	213	213	213.0
LSD 0.05	0.78	0.88	0.55	0.06	0.09	0.08	7.16	16.35	12.65

Table 9b. Effect of foliar application with some aliment available Fe, Mn and Zn in soil concentration after sowing in both seasons and their combined

Treat.	Fe mg /kg			Mn mg /kg			Zn mg /kg		
	Season I	Season II	Comb.	Season I	Season II	Comb.	Season I	Season II	Comb.
Control	2.67	2.70	2.65	1.26	1.29	1.27	0.61	0.63	0.62
Bio-fertilizer	2.75	2.79	2.77	1.69	1.73	1.71	0.66	0.68	0.67
Compost–T	2.85	2.87	2.86	1.74	1.77	1.76	0.74	0.76	0.71
Humic acid	2.76	2.59	2.73	1.71	1.74	1.73	0.69	0.71	0.70
LSD 0.05	0.06	0.07	0.08	0.02	0.09	0.12	0.04	0.04	0.03

Economic evaluation:

Costs: Total costs including values of production tools and requirements such as seeds, fertilizers, irrigation, man power, machinery and other general or miscellaneous costs without land rent average summer 2016/2017 and 2017/2018 seasons are shown in Table (10). The cost of 50 kilogram urea was 100 L.E. added at rate 60kg N/fed for three times 25, 50 and 70 days from sowing, the cost of 50 kilogram super phosphate 15.5% was 65 L.E. (added during soil tillage at 200kg P_2o_5/fed) and the price of 50 kilogram potassium sulphate was 250 L.E added at 65 kg k_2 0/fed on two times 25 and 50 days from planting. Biological yield was recorded by harvesting the whole plot and then converted into ton/fed. Seed yield was obtained after separated from heads plant after air dried material. Thousand seed weight (g) the price of one kilogram seeds was 30 L. E. the total cost of soil tillage involved the price for plowing by chisel plow was 300 L.E. Data depicted in Table (10) found that total prices of Egyptian clover production per feddan as influenced by the applied treatments (average of 2016/17 and 2017/18).

Table 10. Estimated net return L.E.fed.$^{-1}$ of forage Egyptian clover treated with mineral, compost, bio– fertilizer and humic acid across of the two seasons 2016/17 and 2017/18

Treatments Cost of production inputs	Control	Compost- tea	Bio – fertilizer	Humic acid
land preparation				
Tillage	300.00	300.00	300.00	300.00
Planting	400.00	400.00	400.00	400.00
Seeds	450	450	450	450
Irrigation	800	800	800	800
Mineral fertilization				
Ammonium nitrate (33.5% N)	600	-	-	-
Compost- tea	-	950	-	-
Humic acid	-	-	340	-
Bio-fertilization	-	-	-	580
Super phosphate (15.5% P_2O_5)	550	550	550	550
Potassium sulphate (48% K_2O)	630	630	630	630
Hoeing	600	600	600	600
Harvesting	500	500	500	500
Total variable cost	4830	5180	4570	4810
Yield ton /fed	50.14	55.89	60.04	64.53
Price Yield/ ton	350	350	350	350
Seeds ton /fed	0.199	0.238	0.256	0.273
Price Seeds /ton	30	30	30	30
Total revenue	17,555	26,702	21,022	30,776
Net return	12,725	21,572	16,452	25,966
Return of invested L.E.	3.63	5.15	4.60	6.40
Net return of invested L.E.	2.63	4.15	3.60	5.40

It is clear that from date the minimum total costs were those of application of bio-fertilizer being 4570 L.E then maximum total costs of plants received the Compost-T rate which was 5180 L.E. Average over all treatments of total costs were 4847.5 L.E.

Net return

Results in Table (10) reveal that the highest net farm return were recorded in T4 (25,966 L.E.fed^{-1}) followed by the T2 (21,572 L.E.fed^{-1}) and T3 (16,452 L.E.fed.$^{-1}$) while, gave the lowest value in control N fertilization (12,725 L.E.fed.$^{-1}$). The highest value of net return per one invested L.E. was recorded of application Humic acid and Compost-T compared with control N fertilization (6.40 and 5.15 L.E.), followed by bio-fertilizer and control (4.60 and 3.63 L. E.) respectively. The result in table (10) was highest total revenue L. E. fed^{-1} by Humic acid fertilizer (5.40) than other treatment, followed the lowest net return of invested were (2.63 L.E.) recorded by control. Generally, it could be concluded that most yield and yield components, plant height, fresh yield, dry yield, protein contents, digestible crude protein, total carbohydrate, fiber fraction and weight of seeds, weight of 1000 seed were have been increased with applying foliar of humic acid. The effect of combination between compost, bio fertilizer, humic acid and nitrogen fertilizers showed a significant effect on all Qualities and its components under study in soil salinity, it is obvious from the result that forage berseem clover cultivar fertilized with foliar humic acid gave the highest values for most characters under study.

ACKNOWLEDGEMENT

Thanks for all consideration are based on official and actual market prices resolved by Muhamed Abd El–Halim the Ministry of Agriculture and the Agricultural Credit and Development Bank.

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تحسين إنتاجية وجودة البرسيم المصري باستخدام التسميد الحيوى و العضوي تحت ظروف الأراضي الجديدة الملحية

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أقيمت تجربتان حقليتان لموسمين شتويين 2017/2016 و 2017 /2018 بمحطة بحوث سهل الحسينيه– محافظة الشرقية (الخاصة بقسم بحوث الأراضي الجيريه والرملية - معهد بحوث الأراضي والمياة والبيئة) التابعة لمركز البحوث الزراعية ، لتقيم تأثير الرش الورقي بحامض الهيوميك ومستخلص كمبوست الشاي والسماد الحيوي علي انتاج العلف والبذور و التحليل الكيماوي للنبات والتربة. أظهرت النتائج وجود زيادة معنوية فى محصول البرسيم باستخدام المخصبات الحيوية ، حامض الهيوميك وكمبوست الشاي ، وقد أعطى حامض الهيوميك أعلي القيم فى محصول العلف ومكوناته و الجودة مقارنه بالمعاملات الأخرى. البيانات التي تم الحصول عليها تشير إلى أن محصول العلف تأثربوضوح بجميع المعاملات تحت ظروف الأراضي الملحية. إضافة حامض الهيوميك أدي إلي زيادة في إرتفاع النبات، المحصول الأخضروالجاف، محصول البذرة، وزن ال 1000 بذرة ، البروتين الخام، مكونات الألياف، الكربوهيدرات الكلية، البروتين الخام المهضوم فى محصول العلف مقارنة مع الكنترول. حموضة التربة والملوحة انخفضت بسبب المعاملات المختلفة باستخدام الرش الورقي، بينما بلغت الملوحة أدنى القيم في التربة 4.77 (dSm^{-1}) عن طريق إستخدام حمض الهيوميك. قيم خصائص التربة المعاملة بجميع المعاملات كانت منخفضة نسبيا مقارنة بالكنترول والمتاح من المغذيات الكبرى والصغرى في التربة بعد حصاد علف البرسيم بالمقارنة مع المعاملات الأخرى. من الواضح أن الحد الأدنى لمجموع التكاليف من إستخدام المخصبات الحيوية 4570 جنيه والتكاليف الإجمالية القصوى للنبات كانت باستخدام كمبوست الشاي الموصى بها 5180 جنيه، في متوسط جميع تكاليف المعاملات الإجمالية 4847.5 جنيه مصري للموسمين الإثنين على التوالي. صافي أعلى ربح لكل وحدة استثمرت بالجنيه، إستخدام حمض الهيوميك حقق (5.40 جنيه) والسماد العضوي كمبوست الشاي (4.15 جنيه) مقارنة مع التسميد النيتروجيني (الكنترول 2.63).