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IMPROVEMENT OF FIG GROWTH AND PRODUCTIVITY AT SIWA OASIS

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ABSTRACT

This study was conducted during the two successive seasons of 2016and 2017 at khamisa research station farm of Desert Research Center**,** under Siwa Oasis – Matrouh Governorate – Egypt on Conadria fig cultivar grown under salinity stress to study the effect of some biological compounds (biomagic, yeast and biovite) on improving productivity. Four treatments of foliar applications :(T_1): tap water, biomagic at 7.5% (T_2), yeast extracts at 5g/l (T_3), and biomgic7.5% + yeast extracts 5g/l (T_4) sprayed once every two month starting from January until the harvest time. In addition, soil inoculated twice at (January and March) in the rizosphere area with irrigation water by three treatments (control 0 (B_1), 100 ml/tree (B_2) and 200 ml/tree (B_3) of biovite suspension 1%. The obtained results revealed that all treatments were very effective on growth parameters, yield (fruits number and weights) for etch of "boni-crop", "main-crop" and final crop in addition to fruit physical and chemical characteristics. Generally, T_4 under B_3 increased shoot length, leaves number /shoot, leaf area, leaf total chlorophyll, number of fruits (boni-crop), number of fruits (main-crop), total number of fruits, weight of fruits (boni-crop), weight of fruits (main-crop), total yield, fruit weight, fruit height, fruit diameter, total soluble solid, reducing sugars, non- reducing sugars, total sugars and decreased total acidity in both seasons. It is also clear that B_3 increased total microbial account with plant growth reaching their highest figures after 90 days from inoculation. In addition, B_3 decreased EC, pH, Na, and Cl in soil at the end of each seasons.

Key words: bio-fertilization, fig, salinity stress, Siwa Oasis

INTRODUCTION

Fig (*Ficus carica* L.) is one of the deciduous fruit trees belong to the family *Moraceae.* Vigorous and precocious tree produces a good breba crop and a very good second crop. Yellow-green skinned figs have strawberry colored sweet flesh and are good for fresh eating and drying. They have a small eye and resist spoilage. The low growth and production of fig trees in arid regions are apparently due to many factors such as insufficient irrigation, unbalanced or insufficient fertilization, salinity and pests which attack these trees (**Taha, *et al,* 1989**).

Siwa oasis is an urban oasis in Egypt between the Qattara Depression and the Great Sand Sea in the Western Desert. It is located at the northern edge of the Great Sand Sea, It is a great natural depression that has an altitude of 23m below sea level. Siwa is characterizes by severe drought environment. According to the meteorological data of Siwa station, the climate of Siwa exhibits extreme aridity. In addition, the climate is somewhat warmer and more humid in summer than most other desert areas of similar latitude, and is slightly colder in winter. However, these areas are suffering from land degradation problems.

Salinity is a major problem and one of the most significant environmental challenges limiting crop production all over the world, particularly in arid and semi-arid climates. The constituent cations of total soluble salts in soils are usually sodium (Na^{+}), calcium (Ca^{+2}), and magnesium (Mg^{+2}) and the anions are chloride (Cl^{-}), sulphate (SO_4^{-2}) and carbonate (including bicarbonate; CO_3^{-2}, HCO_3^{-}). However, Na^{+} dominates the cations and Cl^{-} is the anions in the majority of saline soils to the extent that NaCl comprises from 50–80% of the total soluble salts **(Rengasamy, 2010).** Salt stress has 3-fold effects on plant growth: it reduces soil water potential leading to osmotic stress, it induces ion imbalance in cells, especially lower concentrations of K^{+}, Ca^{+2}, and NO_3^{-}, and it causes ion (Na^{+} and/or Cl^{-}) toxicity. Since salt stress involves both osmotic and ionic stresses, growth suppression is directly related to the total concentration of soluble salts and the osmotic potential of the soil solution. The detrimental effect is observed at the whole-plant level as the death of plants or a decrease in productivity **(Munns and Tester, 2008)**. Therefore, understanding the mechanisms of tolerance to high soil concentration of NaCl is essential to improve crop salt tolerance. In addition, salinity stress decreased growth parameters in the fig tree **(Mahvash and Majid 2016).**

Bio-fertilization is biological preparations containing primarily patent strains of micro- organisms in sufficient numbers. These micro-organisms have definite beneficial roles in the fertility of soil rhizospheres and the growth of plants by fixing atmospheric N_2, both in association with plant roots and independent of roots, solubilizing insoluble soil phosphates, and producing plant growth substances in the soil. Bio-fertilizers proved to eliminate the use of pesticides sometimes, and rebalance the ratio between plant nutrients in soils. They are easy and safe to handle with field applications that improved their efficiency in increasing crop yields and decreasing the costs of some agricultural practices. It is worthy to state that, biofertilizers do not replace mineral fertilizers, but significantly reduce their rate of application **(Ishac, 1989 and Saber, 1993).** Bio-fertilizers are very safe for human, animal and environment. Since they reduce at the lower extent the great pollution happened in the environment. Inoculation with bio-fertilization under saline stress condition is useful as it can accumulate compatible solutes, such as glycine betaine, glutamate and proline, to allow adaptation to the fluctuations of soil salinity.

Bio-fertilizers are the most importance for plant production and soil as they play an important role in increasing vegetative growth, yield and fruit quality **(Soliman,2001)** on guava and banana plants and **(Ahmed *et al.*, 1999** and **Osman *et al.*, 2010)** on olive plants, **(Chokha *et al.*, 2000; El-Geuoshy, 2011** and **Bakry *et al.*, 2013)** on sweet orange. Also, **Shaban and Mohsen (2009)** showed that, all bio-fertilizers were effective in improving vegetative growth and nutritional status of sweet orang transplants. **Khamis, *et al.*, (2014**) indicated that leaf photosynthetic pigments content (chlorophyll A, B and carotenoids) were improved by bio-fertilizers.

Biomagic product is a biological promoter of microbial origin and contains many of the biological products, which affect plant growth and productivity and increase the plant immunity to microbial diseases. Biomagic product consists of amino acids, vitamins, macro and micro elements which, in turn, increase the vegetative growth, total yield, period of production, enhancing photosynthesis and encourage absorbing of water and nutrients from the soil Biomagic product does not contain any of the synthetic phytohormones, **(El-Sibaie,1995). Izquierdo *et al.*, (1993)** and **Chokha *et al.*, (2000)** stated that Volkamryana lemon and Mosambi sweet orange increased growth measurements using biomagic.

Biovite is a bio fertilizer contains different selective strains of bacteria, which encourage plant tolerance for stress conditions (drought,

salinity and temperature) by releasing enzymes which decompose organic manure and produce antibiotics which have high ability to stop fungal and bacterial diseases. In addition, biovite improved soil properties and increased the status of minerals release in suitable form to be absorbed by plants **(Ibrahim, 2009). El- Massiry (2009)** reported that application of biomagic combined with biovite increased lettuce plant growth characters and total yield. Also, the application of both biomagic and biovite on globe artichoke induced increases of plant height, leaf number, leaf area and chlorophyll **(Ibrahim 2009).**

The dry bread yeast (*Saccharomyces cerevisiae*) is a kind of the used biofertilizers for soil or for foliar application on the shoots of vegetable crops to improve growth of fruit crops **(El-Ghamriny *et al.*, 1999, Subba Rao, 2008** and **Nijjar, 1985).** This is due to its content of many nutrient elements protein, large amount of vitamin B and being productive compounds of the same growth regulators compounds like auxins, gibberellins and cytokinins **(Glick, 1995).** Moreover, it use also as a natural bio-stimulant appeared to induce an astonished influence on growth of many crops, since it has various basic function, i.e. CO_2 production as well as formation of alcohol, acids and esters **(Magoffin and Hoseney, 1974** and **Martinez- Anoya *et al.*, 1990)**. In addition, **(Ferguson *et al*, 1987; Idso *et al.*, 1995** and **Hashem *et al.*, 2008)** added that application of active dry yeast was very effective in releasing CO_2 which reflected on improving net photosynthesis. Active dry yeast at 0.1 % caused a striking improvement in growth of the berries for Red roomy grapes **(Ahmed *et al.*, 1997).** In apple, dry yeast was very effective in improving leaf area. **(Mansour, 1998).** In Valencia orange trees, spraying active dry yeast at 0.25 to 0.75% on March or / and August was favorable in improving growth, fruit weight and volume **(Hegab *et al.*, 1997 and 2005)**. However, **Elham *et al.*, (2010)** showed that spraying mango trees with algae at 2% combined with yeast at 0.2% increased fruit length, fruit width and fruit weight. **Sheren (2014a&b)** stated that sprayed mango trees with yeast extract gave the best leaf area, leaf chlorophyll, fruit length, diameter, weight, yield, total soluble solids (T.S.S.), total sugar, non-reducing sugar and decrease fruit acidity.

The aim of this study was to investigate the effect of some biological compounds (i.e. biovite, biomagic and yeast) on growth and productivity of Conadria fig tree under salinity stress in Siwa Oasis.

MATERIALS AND METHODS

This study was conducted during the two successive seasons of 2016and 2017 at khamisa research station of D.R.C. at Siwa Oasis – Matrouh Governorate – Egypt on 36 trees of Conadria fig cv grown under saline stress to study the effect of some biological compounds (biovite, biomagic and yeast) on improving productivity. The selected trees were 10 years old, planted at 5 X 5 m apart, and grown in sandy soil under drip irrigation system. All are almost uniform in shape and received the common horticultural practices. The soil and irrigation water analysis data are given in **Table (1).** Four treatments of foliar applications :(T_1): tap water, biomagic at 7.5% (T_2), yeast extracts at 5g/l (T_3): and biomagic7.5% + yeast extracts 5g/l (T_4) sprayed once every two month starting from January until the harvest time. In addition, soil inoculated twice at (January and March) in the rhizospheres area with irrigation water by tree treatments (control 0 (B_1), 100 ml/tree (B_2) and 200 ml/tree (B_3) of biovite suspension 1%. The experiment was designed as spilt plot design each treatment represented by 3replecat of 3 trees each.

Table (1): Some physical and chemical analysis of the experiment soil and irrigation water at khamisa research station Siwa oasis.

Particle size distribution%			Texture soil	Ec ds/m1	pH	Soluble cations meq/l				Soluble anions meq/l			
Sand	Silt	Clay				Ca2+	Mg2+	Na+	K+	SO4-	Cl-	HCO3	CO3
81.2	8.57	10.23	Sand loamy	9.05	7.7	25	12.1	52.1	1.3	26.2	61.5	2.8	-

EC, pH and Soluble cations and anions in water of irrigation ($mmol_c$ L^{-1})									
EC (dS/m) dSm^{-1}	pH	Soluble Cations ($melcL^{-1}$)				Soluble Anions ($melcL^{-1}$)			
		Ca^{+2}	Mg^{+2}	Na^{+}	K^{+}	SO_4	Cl	HCO_3^-	CO_3^-
6.78	7.7	21.8	9.7	35.95	0.35	10.8	47.5	9.5	-

The Biovite consists *of Azotobacter chococcom*, *Bacillus subtilis*, *Bacillus megaterium*, *Bradyphizobiu japonicum* and *Pseudomonas flouresence*. Number after dilution was 10.000.000.000 in one ml for all spices from bacteria **(El-Sibaie 1995)**.

Yeast extract was prepared by **Spencer *et al*, (1983)** described to which allowed yeast cells (pure dry yeast) to grow and multiply efficiently during conducive aerobic and nutritional conditions which, in turn, allow to produce beneficial bio constituent (carbohydrates, sugars, proteins amino acids, fatty acids, hormones, etc.). Then these constituents could be released out of yeast cells in readily form by two cycles of freezing and thawing for disruption of yeast cells and releasing their

contents. Biomagic **El Massiry, (2009**) and yeast extract **Mahmoud, (2001)** were presented in **Table (2).**

Table 2: The analysis of biomagic and yeast extract.

Biomagic				Yeast extract					
Amino acids (2.07%)	**Vitamens (0.04 %)**	**Ma.E (in mg/l)**	**M i. E (3.7 % inmg/l)**	**Amino acid mg/100g dry weight**		**Vitamins mg/100g dry weight**		**Carbohydrates mg/100g dry weight**	
Arginine	thiamine	1125 N	45 Mg	Arginine	1.99	Vit.B1	2.23	Carbo	23.2
cystine	biotene	550 P_2O_5	160 Fe	Histidine	2.63	Vit.B2	1.33	Glucose	13.33
glycine	choline	625 k_2O	124 Zn	Isoleucine	2.31	Vit.B6	1.25	**minerals (mg/g):**	
histidine	folic acid		100 Mn	Leucine	3.09	Vit B12	0.15	**Na**	0.12
leucine	niacine		45 Cu	Lysine	2.95	Insitol	0.26	**Ca**	0.75
lysine	pantothinic		14 B	Methionine	0.72			**Fe**	0.02
phenylalanine	pyrodxine		12 Mo	Phenylalanine	2.01			**Mg**	1.65
theronine	rhiboflavin		8 Co	Threonine	2.09	Biotin	0.09	**K**	21.00
tryptophane				Tryptophan	0.45			**P**	13.50
tyrosine				Valine	2.19	Panthothenic acid	19.56	**S**	3.90
valine				Glutamic acid	2.00	Paminobenzoic acid	9.23	**Zn**	0.17
				Serine	1.59	Folic acid	4.36	**Cu**	8.00
				Aspartic acid	1.33	Pyridoxine	2.90	**Mn**	0.02
				Cystine	0.23			**Ni**	3.00
				Proline	1.53				
				Tyrosine	1.49				

Ma. E.= Macroelements M i- E.= Microelements Carbo.= Carbohydrates

The following parameters were measured:

1. Shoot length and Leaves number /shoot:

at the end of each current season (first week of October).

2. Leaf area (cm^2):

was determined by using the leaf area meter CL203.

3-Total chlorophyll contents in leaf:

measured using Minolta chlorophyll meter SPAD- 502 was estimated on the selected branches

4-Yield per tree:

The yield per tree (number and weight of fruits) of both "boni-crop" and "main-crop" were determined. The total numbers of fruit and their weight/ tree/year were calculated.

The weight of all fruit picked during (boni-crop) and (main-crop) were calculated.

5- Fruit quality:

Fruit samples of the "Main-crop" were taken on the 2nd week of August to determine fruit physical and chemical properties.

6- Fruit parameters (fruit physical characteristics):

Fruits sample were taken at the harvest time to be used for determining the physical properties (i.e., fruit weight (g), fruit height (cm) and fruit diameter (cm).

7-Fruit quality (fruit chemical characteristics):

a sample of 10 mature fruits of each tree was taken at the harvest time to be used for determining the chemical properties (i.e., the total soluble solids percentage (T.S.S. %) that measured using a hand refractometer, and the fruit juice % used to determine total acidity by titration against standard sodium hydroxide solution (0.1 N) using phenolphthalein as an indicator). The reducing, non-reducing and total sugars determined according to **A.O.A.C (1985)**.

8-Microbial cultures and biofertilizers inoculation:

Three soil samples were taken every 30 days after inoculating the soil to record the total microbial counts according to **Nautiyal,(1999).**

9. Soil nutrient contents:

Before applying the treatments and at the end of each season, soil samples were taken from each treatment at major root zone (0–60 cm depth). Soil samples were prepared for analysis according to **Jackson (1967).** These soil samples were dried, sieved (through 2 mm) and analyzed for soluble cations and soluble anions as discussed by **Page et al. (1982).**

10. Statistical Analysis

The obtained data were subjected to analysis of variance according to **Clarke and Kempson (1997).** Means were differentiated using Range test at the 0.05 level **(Duncan, 1955).**

RESULTS AND DISCUSSION

Shoot length (cm), leaves number /shoot, leaf area (cm^2) and leaf total chlorophyll (SPAD)

Data in **Table (3)**, clear that shoot length, leaves number, leaf area and leaf total chlorophyll were significantly affected by all treatments in both seasons. However, T_4 gave the best shoot length, leaves number, leaf area in both seasons and leaf total chlorophyll in first season. While, there was insignificant difference between T_4 and T_2 on leaf total chlorophyll in the second season. On the other side, T_1 was the lowest in shoot length, leaves number, leaf area and leaf total chlorophyll in both seasons.

In addition, shoot length, leaves number, leaf area and total chlorophyll were affected significantly by inoculating soil by biovite in both seasons. However, B_3 produced the highest shoot length, leaves number and leaf area in both seasons and leaf total chlorophyll in the second season, while there was insignificant difference between B_2 and B_3 in leaf total chlorophyll in the season compared with the other treatments. On the other side, B_1 recorded the lowest shoot length, leaves number, leaf area and total chlorophyll in both seasons.

The data of the interaction between spraying biomagic and yeast and inoculating soil by biovite showed that, T_3 under B_2 recorded the highest shoot length, leaves number and leaf area in both seasons, while, there was insignificant affect among T_4 under B_2 and B_3 in leaf total chlorophyll in the first and second season as compared with the other treatments. In addition, T_1 under B_1 recorded the lowest shoot length, leaves number, leaf area and total chlorophyll in both seasons.

These results may be due to that bio fertilizers have the potential to increase salt tolerance of crops and reduce soil salinization. In addition, the role of different strains of bacteria in biovite to encourage plant tolerance to stress condition and release nutrition minerals in suitable form to be absorbed by plants as reported by **Hafez, (2013).** It is also could be due to the biomagic contents of proteins, amino acids, vitamins and hormones, as well as some micro nutrients. Furthermore, it could be due to the effective components of yeast such as major and minor elements, growth regulator and vitamins which enhanced cell division, metabolism and other biological reactions, in addition to the activation effect of these components on photosynthesis and promoting protoplasm formation including RNA and DNA that important for cell division. All of these materials lead to reduce the impact of salinity on the plant **(Barnett *et al*., 1990, Fathy and Farid 1996, Abd El-fattah and Sorial 1998, Khedr and Farid 2000, El Massiry 2009, Ibrahim 2009, El-Hifny and El-Sayed 2011**and **Hanan 2016).**

Table (3). Effect of spraying biomagic and yeast (A) and biovite application (B) on some growth parameters of Conadria fig trees during 2016 and 2017 seasons.

parameters / Treatments		Shoot length (cm)		Leaves number/ shoot		Leaf area (cm²)		leaf total chlorophyll(SPAD)	
		Season 2016	Season 2017	Season 2016	Season 2017	Season 2016	Season 2017	Season 2016	Season 2017
Effect of spraying biomagic and yeast (A)									
T_1		21.65d	22.02 d	13.44d	13.88 d	502.22d	503.53d	39.36 c	39.55d
T_2		29.30b	29.55 b	15.77b	16.11 b	508.45b	508.51b	41.91 a	42.03b
T_3		26.92c	27.25 c	15.11c	15.44 c	506.64c	507.00c	41.14b	41.33 c
T_4		31.66a	32.06 a	16.66 a	17.11 a	511.42a	511.64a	42.26 a	42.51a
Effect of application biovite (B)									
B_1		23.91c	24.306 c	14.25 c	14.58c	504.56c	505.40c	40.16c	40.306b
B_2		28.39 b	28.60 b	15.41 b	15.83 b	507.75b	508.11b	41.51b	41.73 a
B_3		29.85a	30.25 a	16.08 a	16.50a	509.24a	509.50a	41.84a	42.04 a
The interaction between A&B									
(A)	**(B)**	**Shoot length(cm)**		**Leaves number/ shoot**		**Leaf area (cm²)**		**leaf total chlorophyll (SPAD)**	
		Season 2016	**Season 2017**	**Season 2016**	**Season 2017**	**Season 2016**	**Season 2017**	**Season 2016**	**Season 2017**
T_1	B_1	20.48k	21.00k	13.00 j	13.33 j	500.00 h	503.00i	38.74 g	39.07h
	B_2	21.66j	21.90j	13.33ij	14.00 ij	502.67g	503.26 i	39.69 ef	39.85g
	B_3	22.82i	23.15i	14.00 hi	14.33hi	504.00 g	504.33h	39.66f	39.75g
T_2	B_1	24.96h	25.07h	14.66fgh	15.00fgh	505.80 f	505.79 g	40.98c	40.66 f
	B_2	30.85d	31.18d	16.00 cd	16.33cd	509.00 d	509.33 d	42.12b	42.56bc
	B_3	32.08c	27.75f	16.66 bc	17.00 bc	510.56c	510.41 c	42.63a	42.88b
T_3	B_1	23.74i	24.41h	14.33 gh	14.66ghi	505.62 f	505.99 g	40.23de	40.48f
	B_2	27.66f	32.39c	15.33def	15.66def	506.86ef	507.07ef	41.25c	41.51de
	B_3	29.37e	29.60e	15.66 de	16.00de	507.44e	507.93e	41.95 b	42.00cd
T_4	B_1	26.45g	26.73g	15.00efg	15.33efg	506.81ef	506.82 fg	40.70cd	40.99ef
	B_2	33.41b	33.58b	17.00 b	17.33 b	512.47b	512.78b	42.99 a	43.00ab
	B_3	35.13a	35.87a	18.00 a	18.66 a	514.98a	515.34a	43.10 a	43.55 a

Means having the same letter(s) in each column, each factor or interaction are not significantly different at 5% level. Spraying with (T_1: tap water, (T_2): biomagic 7.5%, (T_3): yeast extracts 5g/l and (T_4): biomgic7.5% + yeast 5g/l). While, biovite i.e., (B1 (0), (B_2): biovite at 100 ml and (B_3): biovite at 200 ml.

These results are in harmony with those obtained by **(Barnett *et al.*, 1990, Fathy and Farid 1996, Hegab *et al.*, 1997, Khedr and Farid 2000, Amer 2004, El Massiry 2009** and **Ibrahim 2009)** who reported that biomagic and yeast application improved growth. In addition, dry yeast was very effective in stimulating the leaf area and total leaf carbohydrates **(Mansour, 1998 and Mansour *et al.*, 2006)**. Furthermore**,** this result goes in line with the findings of **Izquierdo *et al.*, (1993)**, **Chokha *et al.*, (2000), Bakry *et al.* (2013)** , **Khamis *et al.* (2012), El-Kobbia (1999), Grassi *et al.*, (1999), Obreza and Hampton (2000) and**

Moustafa (2002) on citrus. **Sheren (2014a&b)** who stated that, the addition of bio- fertilizers increased vegetative growth measurements of mango.

Fruits number /tree (boni-crop), (main-crop) and total fruits number /tree

Data presented in **Table (4),** show that all treatments were significantly effective on fruits number (boni-crop), (main-crop) and total fruits number in both seasons. However, T_4 gave the best fruits number (boni-crop), (main-crop) and total fruits number in both seasons. On the other side, T_1 had the lowest fruits number (boni-crop), fruits number (main-crop) and total fruits number in both seasons.

Table (4). Effect of spraying biomagic and yeast (A) and biovite application (B) on number of fruits/tree (boni-crop), (main-crop) and total number of fruits/tree of Conadria fig trees during 2016 and 2017 seasons.

parameters / Treatments		Fruits number /tree (boni-crop)		Fruits number /tree (main-crop)		Total number of fruits/tree	
		Season 2016	Season 2017	Season 2016	Season 2017	Season 2016	Season 2017
Effect of spraying biomagic and yeast (A)							
T_1		20.55 c	20.88 c	446.22 d	456.44 d	466.78d	477.33 d
T_2		22.66 b	22.77 b	504.33 b	513.44 b	527.00 b	536.22 b
T_3		22.11 b	22.44 b	491.89c	497.67 c	514.00c	520.11c
T_4		23.66 a	23.88 a	512.56 a	518.44 a	536.22a	542.33 a
Effect of application biovite (B)							
B_1		21.25 c	21.58 c	472.08 c	479.50 c	493.33 c	501.08 c
B_2		22.50 b	22.66 b	494.33 b	501.58 b	516.83 b	524.25 b
B_3		23.00 a	23.24 a	499.83 a	508.42 a	522.83 a	531.66 a
The interaction between A&B							
(A)	**(B)**	**Fruits number /tree (boni-crop)**		**Fruits number /tree (main-crop)**		**Total number of fruits/tree**	
		Season 2016	**Season 2017**	**Season 2016**	**Season 2017**	**Season 2016**	**Season 2017**
T_1	B_1	20.00 j	20.33 i	441.00 L C	446.67 k	461.00 l	467.00k
	B_2	20.66 i	21.00hi	446.00 k	457.00 j	466.67k	478.00 j
	B_3	21.00 hi	21.33 gh	451.67 j	465.67 i	472.67 j	487.00 i
T_2	B_1	21.66 fgh	22.00efg	487.67 h	495.33 g	509.33 h	517.33 g
	B_2	23.00 cd	23.00 cd	510.67 d	520.33 c	533.67 d	543.33 c
	B_3	23.33 bc	23.33 bc	514.67 c	524.67 b	538.00 c	548.00 b
T_3	B_1	21.33ghi	21.66 fgh	468.00i	475.67 h	489.33 i	497.33 h
	B_2	22.33def	22.66cde	500.00 f	505.00 e	522.33 f	527.67e
	B_3	22.66 cde	23.00cd	507.67e	512.33 d	530.33 e	535.33d
T_4	B_1	22.00 efg	22.33 def	491.67g	500.33 f	513.67 g	522.67f
	B_2	24.00 b	24.00b	520.67b	524.00 b	544.67 b	548.00 b
	B_3	25.00a	25.31a	525.33a	531.00 a	550.33 a	556.31a

Means having the same letter(s) in each column, each factor or interaction are not significantly different at 5% level.
Spraying with (T_1: tap water, (T_2): biomagic 7.5%, (T_3): yeast extracts 5g/l and (T_4): biomgic7.5% + yeast 5g/l). While, biovite i.e., (B1.(0), (B_2): biovite at 100 ml and (B_3): biovite at 200 ml.

Furthermore, fruits number (boni-crop), (main-crop) and total fruits number were affected significantly by inoculation biovite to soil. However, B_3 produced the highest fruits number (boni-crop), (main-crop) and total fruits number in both seasons. On the other side, B_1 showed the lowest fruits number (boni-crop), (main-crop) and total number of fruits/tree in both seasons in both seasons.

In addition, the interaction between spraying biomagic and yeast and inoculating soil by biovite clear that, T_3 under B_2 recorded the highest fruits number (boni-crop) (25.00 in the 1st and 25.31 in the 2nd season), fruits number (main-crop) (525.33 in the 1st and 531.00 in the 2nd season) and total fruits number (550.33 in the 1st and 556.31 in the 2nd season). While, T_1 under B_1 recorded the lowest fruits number (boni-crop), fruits number (main-crop) and total fruits number in both seasons

Fruits weight /tree (Kg) (boni-crop), (main-crop) (Kg) and total yield/tree (Kg)

It is evident from the data in **Table (5)** that fruits weight in boni-crop, main-crop and total yield/tree were significantly affected by all treatments in both seasons. In addition, T_4 gave the best fruits weight in boni-crop, main-crop and total yield in both season. On the other hand, T_1 gave the lowest fruits weight in boni-crop, main-crop and total yield.

Fruits weight in boni-crop, main-crop and total yield were affected significantly by inoculation biovite to soil. In addition, b_3 produced the highest fruits weight in boni-crop (1.03 in the 1st and 1.05 kg in the 2nd season), main-crop (22.55 in the 1st and 23.11 kg in the 2nd season) and total yield (23.59 in the 1st and 24.17 kg in the 2nd season). On the other side, B_1 gave the lowest fruits weight in boni-crop, main-crop and total yield in both seasons.

Furthermore, the interaction between spraying biomagic and yeast and inoculated soil by biovite presented that, T_4 under B_3 recorded the highest fruits weight in boni-crop, fruits weight in main-crop and total yield/tree in both seasons. While, T_1 under B_1 recorded the lowest fruits weight in boni-crop, fruits weight in main-crop and total yield in both seasons.

These results in **Table (4&5)** could be due to microbe action on releasing natural hormones beside vitamin B group which increase root growth, consequently, increase the ability of plants to absorb more water and nutrients (N, P, K) from deep layers of soil so increased total yield **(El-Afifi *et al*. 2002).** In addition, the role of biomagic in increasing production period, enhancing photosynthesis, and encouraging absorbing

water and nutritional elements from soil **(El Massiry, 2009** and **Ibrahim, 2009).**

These results agree with those obtained by **El Massiry (2009), Ibrahim (2009)**, **El-Hifny** and **El-Sayed (2011**), **Barnett *et al*., (1990) Fathy and Farid, (1996) Khedr and Farid (2000),** and **Amer (2004)** who found that foliar spray with both of biomagic and biovite increased total yield and its components

Table (5). Effect of spraying biomagic and yeast (A) and biovite application (B) on weight of fruits/tree (boni-crop), (main-crop) and total yield/tree of Conadria fig trees during 2016 and 2017 seasons.

parameters / Treatments	Fruits weight /tree (Kg) Boni-Crop		Fruits weight /tree (Kg) Main-Crop		Total yield/tree (Kg)	
	Season 2016	Season 2017	Season 2016	Season 2017	Season 2016	Season 2017
Effect of spraying biomagic and yeast (A)						
T_1	0.87 d	0.89d	19.03 d	19.54 d	19.91 d	20.43d
T_2	1.01 b	1.03b	22.65 b	23.28b	23.67 b	24.32b
T_3	0.98 c	0.99 c	21.81 c	22.13 c	22.79 c	23.13c
T_4	1.07 a	1.09a	23.33 a	23.78a	24.41 a	24.87 a
Effect of application biovite (B)						
B_1	0.92 c	0.94c	20.49 c	20.94 c	21.42 c	21.88c
B_2	1.00 b	1.01b	22.08 b	22.50 b	23.08 b	23.51b
B_3	1.03 a	1.05 a	22.55 a	23.11 a	23.59 a	24.17 a
The interaction between A&B						
(A) / **(B)**	**Fruits weight /tree (Kg) Boni-Crop**		**Fruits weight /tree (Kg) Main-Crop**		**Total yield/tree (Kg)**	
	Season 2016	**Season 2017**	**Season 2016**	**Season 2017**	**Season 2016**	**Season 2017**
T_1 B_1	0.84 k	0.85 j	18.55L	18.85 L	19.39 L	19.71 L
B_2	0.88 j	0.90 i	19.12 k	19.64 k	20.01 k	20.54 k
B_3	0.90 ij	0.92 hi	19.43 j	20.12 j	20.33 j	21.04 j
T_2 B_1	0.95gh	0.96 fg	21.43 h	21.79 h	22.38 h	22.76h
B_2	1.03d	1.04 c	22.99 d	23.70d	24.03 d	24.75d
B_3	1.06 c	1.08 b	23.53 c	24.36b	24.60 c	25.44 b
T_3 B_1	0.92 hi	0.94gh	20.36 i	20.82i	21.29i	21.77i
B_2	0.99 ef	1.01 de	22.28 f	22.55f	23.27f	23.56f
B_3	1.01de	1.03 cd	22.80 e	23.03e	23.82e	24.07e
T_4 B_1	0.96 fg	0.99 ef	21.63 g	22.28g	22.60 g	23.28 g
B_2	1.10 b	1.10 b	23.92b	24.10 c	25.03 b	25.20 c
B_3	1.16 a	1.189a	24.44 a	24.95 a	25.61a	26.14 a

Means having the same letter(s) in each column, each factor or interaction are not significantly different at 5% level. Spraying with (T_1: tap water, (T_2): biomagic 7.5%, (T_3): yeast extracts 5g/l and (T_4): biomgic7.5% + yeast 5g/l). While, biovite i.e., (B1: (0), (B_2): biovite at 100 ml and (B_3): biovite at 200 ml.

Fruit weight (g), fruit height (cm) and fruit diameter (cm)

Data in **Table (6),** clear that fruit weight, fruit height and fruit diameter were significantly affected by all treatments in both seasons. However, T_4 gave the best fruit weight (45.50 (g) in the 1st and 45.84 (g) in the 2nd season), fruit height (5.58(cm) in the 1st and 5.64(cm) in the

2^{nd} season) and fruit diameter (5.25 (cm) in the 1^{st} and 5.29(cm) in the 2^{nd} season). On the other side, T_1 was the lowest in fruit weight, fruit height and fruit diameter in both seasons.

Data indicated that fruit weight, fruit height and fruit diameter were affected significantly by inoculation biovite to soil in both seasons. Regarding that effect, treatment B_3 produced the highest fruit weight, fruit height and fruit diameter in both seasons. On the other side, B_1 recorded the lowest value of fruit weight, fruit height and fruit diameter in both seasons.

The data of the interaction between spraying biomagic and yeast and inoculating soil by biovite showed that, T_4 under B_3 recorded the highest fruit weight, fruit height and fruit diameter in both seasons. In addition, T_1 under B_1 recorded the lowest fruit weight, fruit height and fruit diameter in both seasons.

Moreover, the obtained results - regarding the positive effect of bio fertilizers application on some fruit physical characteristics - goes generally in line with those of several investigators (**Paschoal *et al.*, (1999)** on orange and **Abd El-Migeed *et al.*, (2007)** on Washington Navel orange fruits.

Table (6). Effect of spraying biomagic and yeast (A) and biovite application (B) on fruit weight (g), fruit height and fruit diameter of Conadria fig trees during 2016 and 2017 seasons

parameters / Treatments		Fruit weight (g)		Fruit height (cm)		Fruit diameter (cm)	
		Season 2016	Season 2017	Season 2016	Season 2017	Season 2016	Season 2017
Effect of spraying biomagic and yeast (A)							
T_1		42.66 d	42.80 d	5.07 d	5.104d	4.65 d	4.71d
T_2		44.90 b	45.32b	5.47 b	5.48 b	5.16 b	5.22b
T_3		44.33 c	44.46c	5.33c	5.366c	5.11 c	5.15c
T_4		45.50 a	45.84 a	5.58 a	5.640 a	5.25 a	5.290 a
Effect of application biovite (B)							
B_1		43.38 c	43.63c	5.18 c	5.22c	4.90 c	4.95 c
B_2		44.60 b	44.80 b	5.42 b	5.43 b	5.09 b	5.13 b
B_3		45.05 a	45.40 a	5.49 a	5.53 a	5.15a	5.19 a
The interaction between A&B							
(A)	**(B)**	**Fruit weight (g)**		**Fruit height(cm)**		**Fruit diameter(cm)**	
		Season 2016	**Season 2017**	**Season 2016**	**Season 2017**	**Season 2016**	**Season 2017**
T_1	B_1	42.07 k	42.22 L	4.93 h	4.99 L	4.52 L	4.56 k
	B_2	42.88j	42.98 k	5.12g	5.14 k	4.66k	4.77 j
	B_3	43.03 i	43.21j	5.16 fg	5.17 j	4.78 j	4.81 i
T_2	B_1	43.95 g	43.99h	5.28 e	5.30h	5.01h	5.11 g
	B_2	45.03 d	45.56d	5.51 c	5.51 d	5.23d	5.26d
	B_3	45.73 c	46.43 b	5.61 b	5.63 c	5.25c	5.28c
T_3	B_1	43.52 h	43.77i	5.21 f	5.24 i	4.98i	5.00 h
	B_2	44.56 f	44.66 f	5.386 d	5.40f	5.16f	5.20e
	B_3	44.92 e	44.96e	5.42 d	5.45e	5.20e	5.26d
T_4	B_1	44.00 g	44.54g	5.32e	5.35 g	5.11g	5.14 f
	B_2	45.95 b	45.99c	5.66b	5.69b	5.30 b	5.32b
	B_3	46.54 a	47.00 a	5.77a	5.88a	5.36 a	5.41a

Means having the same letter(s) in each column, each factor or interaction are not significantly different at 5% level. Spraying with (T_1: tap water, (T_2): biomagic 7.5%, (T_3): yeast extracts 5g/l and (T_4): biomgic7.5% + yeast 5g/l). While, biovite i.e., (B1: (0), (B_2): biovite at 100 ml and (B_3): biovite at 200 ml.

Total soluble solid and total acidity

Data in **Table (7),** clear that total soluble solid and total acidity were significantly affected by all treatments in both seasons. However, T_4 gave the best total soluble solid (24.39 % in the 1st and 24.43 % in the 2nd season), while, T_4 and T_2 gave the lowest total acidity (0.174% in the 1st and 0.171% in the 2nd season), (0.168% in the 1st and 0.165 % in the 2nd season) respectively. On the other hand, T_1 gave the lowest total soluble solid and the highest total acidity in both seasons.

Total soluble solid and total acidity were affected significantly by inoculating biovite to soil in both seasons. It is clearly evident that, B_3 produced the highest total soluble solid and the lowest total acidity in both seasons. On the other side, B_1 gave the lowest total soluble solid and the highest total acidity in both seasons.

The data of the interaction between spraying biomagic and yeast and inoculating soil by biovite resulted that, T_4 under B_3 recorded the best total soluble solid and the lest total acidity in both seasons. In addition, T_1 under B_1 recorded the lowest total soluble solid in both seasons. However T_1 under B_1 and B_2 gave the highest total acidity in both seasons

Table (7). Effect of spraying biomagic and yeast (A) and biovite application (B) on total soluble solid and total acidity of Conadria fig trees during 2016 and 2017 seasons

parameters / Treatments		TSS (%)		Acidity (%)	
		Season 2016	Season 2017	Season 2016	Season 2017
Effect of spraying biomagic and yeast (A)					
T_1		21.70 d	21.77 d	0.185a	0.186 a
T_2		23.79 b	23.88 b	0.174 bc	0.171 c
T_3		23.08 c	23.23 c	0.181 ab	0.178 b
T_4		24.39 a	24.43 a	0.168 c	0.165 c
Effect of application biovite (B)					
B_1		22.37 c	22.46 c	0.187 a	0.186 a
B_2		23.49 b	23.57 b	0.175 b	0.174 b
B_3		23.86 a	23.96 a	0.169 c	0.165 c
The interaction between A&B					
(A)	**(B)**	**TSS (%)**		**Acidity (%)**	
		Season 2016	**Season 2017**	**Season 2016**	**Season 2017**
T_1	B_1	21.23 L	21.23 L	0.193 a	0.196 a
	B_2	21.88 k	21.98k	0.190ab	0.193 ab
	B_3	22.01 j	22.12 j	0.173efg	0.170fgh
T_2	B_1	22.73h	22.88h	0.186 abc	0.183cd
	B_2	23.98 d	24.01 d	0.170 fgh	0.166 ghi
	B_3	24.65 c	24.77c	0.166 ghi	0.163hij
T_3	B_1	22.54 i	22.72 i	0.186 abc	0.186bc
	B_2	23.14 f	23.32f	0.180 cde	0.176 def
	B_3	23.55 e	23.67 e	0.176 def	0.173efg
T_4	B_1	22.98 g	23.01g	0.183 bcd	0.180cde
	B_2	24.98 b	24.98b	0.163 hi	0.160 ij
	B_3	25.22 a	25.31a	0.160 i	0.156 j

Means having the same letter(s) in each column, each factor or interaction are not significantly different at 5% level. Spraying with (T_1: tap water, (T_2): biomagic 7.5%, (T_3): yeast extracts 5g/l and (T_4): biomgic7.5% + yeast 5g/l). While, biovite i.e., (B1: (0), (B_2): biovite at 100 ml and (B_3): biovite at 200 ml.

Reducing sugar (%), non- reducing sugars (%) and total sugars (%)

It is evident from the data in **Table (8),** reducing sugar, non-reducing sugars and total sugars were significantly affected by all treatments in both seasons. However, T_4 gave the best reducing sugar, non-reducing sugars and total sugars in both season. On the other hand, T_1 gave the lowest reducing sugar, non-reducing sugars and total sugars in both seasons

Reducing sugar, non-reducing sugars and total sugars were affected significantly by inoculation biovite to soil. In addition, B_3 produced the highest reducing sugar (19.35 % in the 1st and 19.57 % in the 2nd season), non-reducing sugars (1.85% in the 1st and 1.86 % in the 2nd season) and total sugars (21.20% in the 1st and 21.43% in the 2nd season). On the other side, B_1 gave the lowest in reducing sugar (18.53 % in the 1st and 18.77 % in the 2nd season), non-reducing sugars (1.71 % in the 1st and 1.72 % in the 2nd season) and total sugars (20.24 % in the 1st and 20.49 % in the 2nd season) in both seasons.

Table (8). Effect of spraying biomagic and yeast (A) and biovite application (B) on reducing sugar, non- reducing sugars and total sugars of Conadria fig trees during 2016 and 2017 seasons

parameters / Treatments		Reducing sugar (%)		Non- reducing sugars (%)		Total sugars (%)	
		Season 2016	Season 2017	Season 2016	Season 2017	Season 2016	Season 2017
Effect of spraying biomagic and yeast (A)							
T_1		18.19 d	18.30 d	1.64 d	1.65d	19.83 d	19.95d
T_2		19.30 b	19.61b	1.84 b	1.85b	21.14 b	21.46b
T_3		18.90 c	19.27c	1.79 c	1.80c	20.69 c	21.07c
T_4		19.66 a	19.82a	1.90 a	1.92 a	21.56 a	21.74 a
Effect of application biovite (B)							
B_1		18.53 c	18.77 c	1.71 c	1.72c	20.24 c	20.49c
B_2		19.16 b	19.41 b	1.82 b	1.83 b	20.98 b	21.24b
B_3		19.35 a	19.57 a	1.85 a	1.86 a	21.20a	21.43a
The interaction between A&B							
(A)	**(B)**	**Reducing sugar (%)**		**Non- reducing sugars (%)**		**Total sugars (%)**	
		Season 2016	**Season 2017**	**Season 2016**	**Season 2017**	**Season 2016**	**Season 2017**
T_1	B_1	18.00 l	18.12 l	1.62 l	1.62 l	19.62 l	19.74l
	B_2	18.22 k	18.32k	1.64 k	1.65 k	19.86 k	19.97 k
	B_3	18.35 j	18.47 j	1.68 j	1.69 j	20.03 j	20.16 j
T_2	B_1	18.68 h	18.98h	1.75 h	1.75 h	20.43 h	20.73 h
	B_2	19.44 d	19.87 d	1.88 d	1.89d	21.32 d	21.76d
	B_3	19.77c	19.98 c	1.90c	1.91 c	21.67 c	21.89c
T_3	B_1	18.55i	18.76 i	1.71i	1.71 i	20.26 i	20.47 i
	B_2	18.98f	19.43 f	1.82 f	1.83 f	20.80f	21.26f
	B_3	19.17e	19.63e	1.85 e	1.86e	21.02 e	21.49 e
T_4	B_1	18.88g	19.22g	1.79 g	1.79 g	20.67g	21.01g
	B_2	19.98 b	20.01 b	1.94 b	1.97b	21.92 b	21.98 b
	B_3	20.12 a	20.23 a	1.99 a	1.99 a	22.11 a	22.22a

Means having the same letter(s) in each column, each factor or interaction are not significantly different at 5% level. Spraying with (T_1: tap water, (T_2): biomagic 7.5%, (T_3): yeast extracts 5g/l and (T_4): biomgic7.5% + yeast 5g/l). While, biovite i.e., (B1: (0), (B_2): biovite at 100 ml and (B_3): biovite at 200 ml.

Furthermore, the interaction between spraying biomagic and yeast and soil inoculating by biovite clear that, T_4 under B_3 recorded the highest reducing sugar, non-reducing sugars and total sugars in both seasons. While, T_1 under B_1 recorded the lowest reducing sugar, non-reducing sugars and total sugars in both seasons.

Results revealed that fruits grown under bio fertilizer had better fruit quality. The increase in physicochemical parameters in fruits due to bio-fertilizer might be because of their role in nitrogen fixation, production of

phytohormones-like substances and increased uptake of nitrogen as reported by **Dutta and Kundu (2012).** Furthermore, micro-organisms are an important component of soil environment **(Arshad and Frankemberger, 1992).** Thus, utilization of biofertilizers could be a better preposition for improving biological attributes of soil, which in turn may increase quality and productivity potential of various crops as reported by **Allen *et al.* (2002)**. In addition, this may be due to synthesis of phytohormones , or reduction of membrane potentials of the roots **(Bashan and Levanony, 1991),** synthesis of some enzymes that modulate the level of plant hormones **(Glick *et al.*, 1998)** and solubilizing of inorganic phosphate **(Krasilnikove, 1961).**

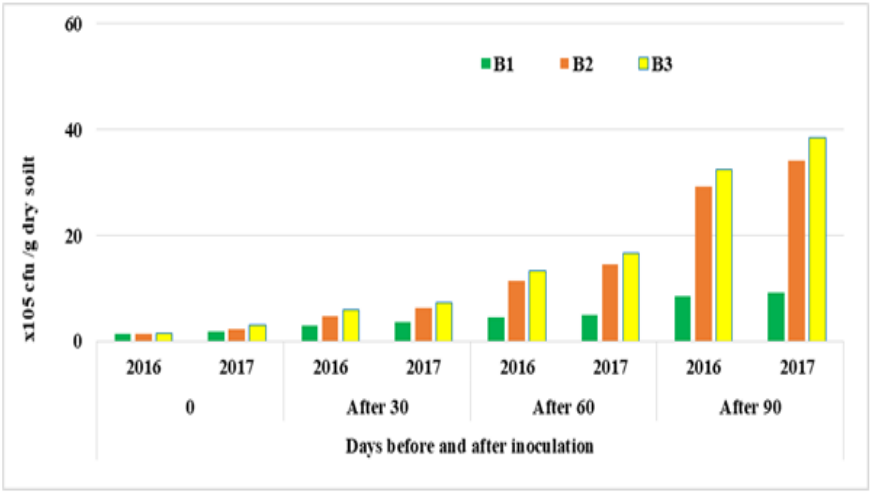
The obtained results regarding the positive effect of bio fertilizer application in enhancement of total sugars content are in general agreement with that found by **Joo *et al.*, (1999)** on treated orange trees with the bio fertilizer. Moreover, findings of **Rabeh *et al.*, (1993)** on Balady mandarin, **Ibrahim and Mohamed, (2000)** on Balady mandarin and **Fathy *et al.*, (2010)** on Canino apricot cv. gave partial support to our results regarding the beneficial effect of some organic fertilizers on increasing fruit juice TSS and total sugars % of Washington navel orange cv., in addition to **Xie *et al.*, (1996)** who reported that microbial Bio-Fertilization seemed to be more effectively on the quality and quantity of Navel oranges.

Total microbial count

The effect of soil inoculated with different level of biovite on total microbial count during fig growth under biofertilizers treatments is shown in **fig (1).** It is clear from the data that biovite has a profound effect on total microbial count under sandy soil conditions. The highest figures were generally in B_3. Addition of biofertilizers resulted in significant increase in total microbial in nearly all treatments. It is also clear that total microbial count increased with plant growth reaching their highest figures after 90 days. The highest figure was in B_3 reaching 33 $x10^5$ cfu /g dry soil. Figures of the second season showed the same trend of those observed in the first season.

These figures are in accordance with those observed by **Migahed *et al.*, (2004),** who reported that total microbial counts in the rhizosphere of celery were significantly higher in the inoculated plants than in the uninoculated ones, with the highest counts being recorded at the flowering stage. Another study carried out by **Mahmoud *et al.*, (2006)** showed that total microbial count increased in the rhizosphere of wheat when plants were inoculated with biofertilizers. **Zahir *et al.* (2003)**

opined that micro-organisms are important component of soil environment and their large number is indicative for better soil health which improves more nutrient availability from source.



Biovite i.e.,(B_1:(0), (B_2): biovite at 100 ml /tree and (B_3): biovite at 200 ml/tree .

Fig1: Effect of soil inoculated with different level of biovite on total microbial count (x10^{5}cfu/g dry soil) during two seasons 2016 and 2017 seasons.

Effect of soil inoculated with different level of biovite on soil chemical properties

Fig.2 (a, b, c and d) Indicates that biovite has a profound effect on soil chemical properties under salinity stress. The highest figures were generally in B_3. It is also clear that EC and pH decreased in soil in the end of first and second seasons. In respect of the essential elements for plants, i.e. Ca, Mg, K and Na the results revealed that the high level of biovite B_3 affected the solubility of these elements in the soil. It appears that B_3 leads to the intensive reduction of soluble Na salts.

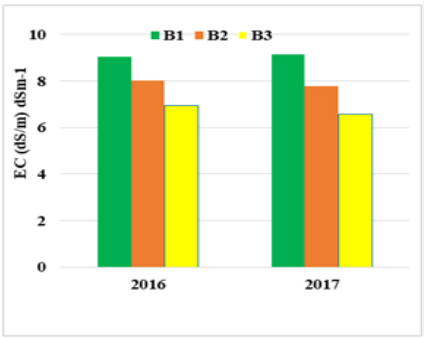


Fig 2 (a) Effect of soil inoculation with different level of biovite on soil EC (dS/m) dSm^{-1}

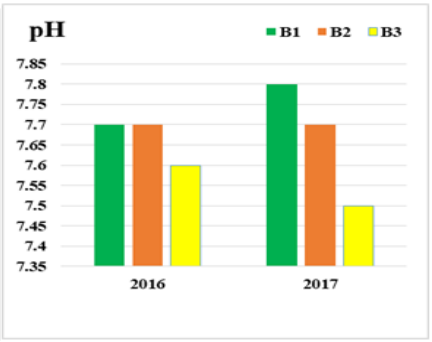
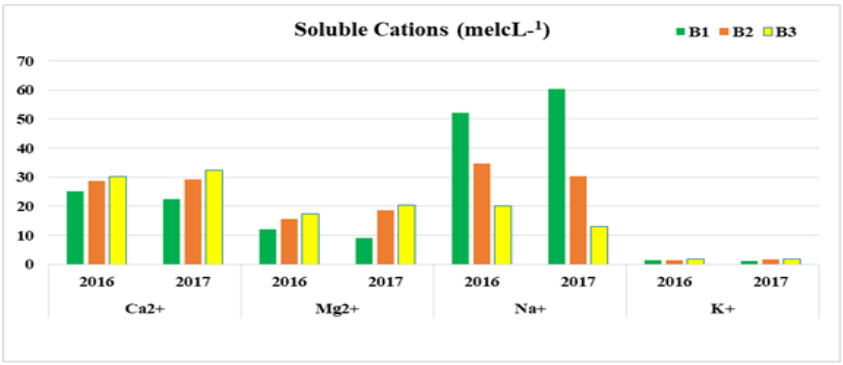
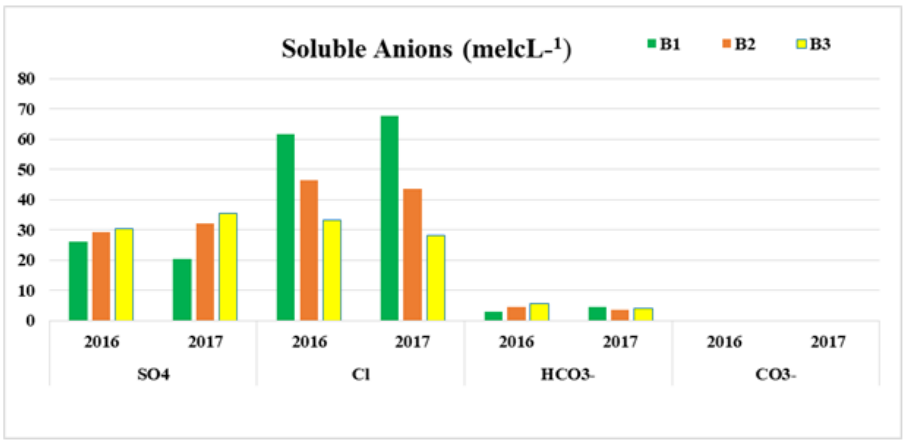


Fig 2 (b) Effect of soil inoculation with different level of biovite on soil pH



Biovite i.e.,(B_1: (0) , (B_2): biovite at 100 ml /tree and (B_3): biovite at 200 ml/tree .

Fig 2 (c) Effect of soil inoculation with different level of biovite on soil soluble cations ($melcL^{-1}$)



Biovite i.e.,(B_1: (0) , (B_2): biovite at 100 ml /tree and (B_3): biovite at 200 ml/tree .

Fig 2 (d) Effect of soil inoculation with different level of biovite on soil soluble anions ($melcL^{-1}$)

These results could be due to biofertilizers is helps to increase the organic carbon content of soils, which may induce better water infiltration, increased capacity to retain nutrients especially N against leaching, volatilization and denitrification losses. It also enhances soil fertility through increased microbial activity. Application of bio-fertilizers substantially increased the soil microbial population which improve the soil health, thereby the growth and productivity of the crop. The use of bio-fertilizers leads to improved nutrients and water uptake, plant growth and plant tolerance to abiotic and biotic factors. In addition, biovite improved soil properties and increased the status of minerals release in suitable form to be absorbed by plants **(Ibrahim, 2009).**

These results are in conformity with **Dutta and Kundu (2012)** in mango and **Mitra *et al.* (2012)** in guava. **Stephen and Nybe (2003)** who showed that the biofertilizers increased soil content of N, K, P, and Ca. Also, **Ipinmoroti, *et al.*, (2008)** reported that biofertilizers resulted in higher soil fertility enhancement in N, P, K, Ca, Mg and organic carbon buildup than NPK and control treatment. Similar results were obtained by **Hardarson and Atkins, (2003)** who found that biofertilizers increased soil cations exchange capacity.

CONCLUSION

Considering the previous results, it seems pertinent to indicate that spraying biomgic7.5% + yeast extracts 5g/l and add 200 ml biovite suspension 1% to the soil of fig orchards under salinity stress could be recommended as environmentally friendly treatment. Furthermore, this treatment could be used not only for fruit orchards, but also for other various crops due to its high potentiality as well as the nutritive value.

REFERENCES

A.O.A.C. (1985). In "Official Methods of Analysis". Association of Official Agricultural Chemists, 14th Ed.: Benjamin Franklin Station Washington, DC, USA, p. 490-510.

Abd El-Fattah; A.M. and M.E. Sorial, (1998). Efficiency of bio fertilization on responses of the productivity and chemical composition of lettuce plants grown under different nitrogen levels. Menofiya J. Agric. Res., 23 (5): 1185-1207.

Abd El-Migeed; M. M.; M. M. Saleh; E. A. Mostafa, (2007). The beneficial effect of minimizing mineral nitrogen fertilization on Washington navel orange trees by using organic and biofertilizers. World J. of Agric. SCI. IDOSI Publications, Faisalabad, Pakistan: 3:1, 80-85.

Ahmed, F.F.; M.A. Ragab; A.A. Ahmed and A.E. Mansour, (1997). Improving the efficiency of spraying different nutrients for Red Roomy grapevines (*Vitis vinifera L*.) by using glycerol and active dry yeast. Egypt. J. Hort., 24(1): 91- 108.

Ahmed, F.F.; G.M. El-Dawwey and A.P. Papasopoulos, (1999). Efficiency of phosphorine (as a source of phosphate solubilizing bacteria) in enhancing growth and P nutrition of Chemlali olive seedlings. International Symposium on growing media and hydroponics, Windsor, Ontario, Canada, 19-26 May, II. Acta Horticulture, (481): 701-705.

Allen M.F.; D.A. Jasper and J.C. Zak (2002) . Microorganism, In: PERROW M.R., and A.J. DAVY (eds.) Handbook of ecological restoration. Cambridge University Press, Cambridge, UK, Vol. I. pp. 257-278

Amer, S.S.A., (2004). Growth, green pods yield and seeds yield of common bean (*phaseolus vulgarisL*.) affected by active dry yeast, salicylic acid and their interaction. J. Agric. Sci. Mansoura Univ., 29: 1407-1422.

Arshad M. and Jr. W.T Frankemberger., (1992). Microbial production of plant growth regulators, pp. 307-348. - In: MEETING F.B. Jr. (ed.) Soil microbial ecology. Application in agricultural and environmental management. Marcel Dekker, Inc. New York, USA

Bakry, Kh.A.; M.A. Khamis; M.M. Sharaf; H.K. Ebrahim and H.I. Yassin, (2013). Response of Washington navel orange trees to foliar spray with some bio and mineral fertilizers. The first international conference for economic development in African and Arab region, 23-24 April, Ismailia, Egypt

Barnett, J.A.; R.W. Payne and D. Yarrow, (1990). Yeasts characteristics and identification. Cambradge. Camb. CBZBR. pp: 999.423.

Bashan, Y. and H. Levanony (1991). Alterations in membrane potential and in proton efflux in plant roots induced by *Azospirillum brasilense*. Plant Soil 137:99–103

Chokha, S.; S. K. Saxena; A. M. Gaswami; R. R. Sharma and C. Singh (2000). Effect of fertilizers on growth, yield and quality on sweet orange (*Citrus sinensis*) Cv. Mosambi. Indian Journal of Horticulture, 57 (2): 114-117.

Clarke, G.M. and R.E. Kempson (1997). In "Introduction to the Design and Analysis of Experiments". (Arnold Ed.). A Member of the Holder Headline Group, London, UK.

Dutta, P. and Kundu, S. (2012). Effect of bio-fertilizers on nutrient status and fruit quality of Himsagar mango grown in new alluvial zones of West Bengal. J. Crop Weed, 8:72-74.

Duncan, D.B. (1955). Multiple ranges and multiple F Test. Biometrics, 11:1-42.

Ebrahiem, T. A. and G. A. Mohamed (2000). Response of Balady mandarin trees growing on sandy soil to application of filter mud and farmyard manure. Assiut Jour. of Agric. Sci. 31 (5): 55-69.

El-Afifi, S.T.; M.M. Zaghloul and E.I. Ibrahim, (2002). Effect of transplant age, nitrogen fertilizer levels and Biofertilization on cabbage. Inter. Conf. Hort. Sci., Kafr El-Sheikh, Tanta Univ., Egypt, 119-130.

El–Geuoshy, S.F., (2011). Physiological and an atomical studies on some factors affecting productivity and nutritional status of Navel orange. Ph.D. Thesis., Fac. of Agric. Benha Univ. Egypt.

El-Ghamriny E.A.,; H. M. E. Arisha and K. A. Nour (1999). Studies in tomato flowering, fruit set, yield and quality in summer Seasons. 1- Spraying with thiamine, ascorbic acid and yeast. Zagazig. J-Agric. Rec. Vol. 26(5):1345-1364.

Elham, Z.; Abd El-Motty Mohamed F.M. Shahin, Mohamed El-Shiekh and Mahmoud M.M. Abd-El- Migeed, (2010). Effect of algae extract and yeast application on growth, nutritional status, yield and fruit quality of Keitte mango trees Agric. Biol. J. N. Am., 1(3): 421-429

El-Hifny, I.M.M. and M.A.M. El-Sayed, (2011). Response of sweet pepper plant growth and productivity to application of ascorbic acid and biofertilizers under saline conditions. Australian Journal of Basic and Applied Sciences, 5(6): 1273-1283.

El-Kobbia, A. M. (1999). Response of Washington navel orange to organic fertilizer "biohumus" and cattle manure application. Alexandria Journal of Agricultural Research, 44(2): 199-207.

EL-Massriy, M.M.A., (2009). Production of lettuce using organic, bio- and mineral fertilization under saline conditions. P.h.D. Thesis. Dep. of Hort., Fac. of Agr. Ain Shams University, Cairo, Egypt.

El-Sibaie, M.F., (1995). Biomagic, a biological promoter patent by the patent office, Academy of

Scentific Research and Technology, Egypt, 5/1995

El-Sayed, M.A.M., (2006). Effect of biofertilizers application on the productivity of Nigella saliva cultivated in desert sandy soils and efficiency of produced seeds against some pathogenic microorganisms. Ph.D. Thesis, Fac. Agric., Moshtohor, Benha Univ., Egypt.

Fathy, E.S.L. and S. Farid, (1996). The possibility of using vitamin B sand yeast to delay senescence and improve growth and yield of common beans (*Phaseolus vulgaris*. L). J. A gric. Sci. Mansoura Univ., 21(4): 1415- 1423.

Fathy, M. A.; M. A. Gabr and S. A. El Shall (2010). Effect of humic acid treatments on 'Canino' Apricot growth, yield and fruit quality. New York Science Journal; 3(12):109-115.

Ferguson, J. J.; W. T. Aving; L. H. Allen, and K. E. Koch, (1987). Growth of CO_2 enriched sour orange seedlings treated with gibberellic acid and cytokinins. Proc. Florida-State Hort. Soc. 38(2): 363-375

Glick, B.R., (1995). The enhancement of plant growth by free living bacteria. Cand. J. Microbiology, 41: 109- 117.

Glick, B.R; D.M. Penrose and J. Li, (1998). A model for the lowering of plant ethylene concentrations by plant growth promoting bacteria. J. Theor. Biol. 190:63-68.

Grassi, F. H.; M. A. Pereira; A. A. Savino and V. T. Rodrigues (1999). Growth of Rangpur lime seedlings (*Citrus limonia*, Osbeck) on different substrates. Revista Brasileira de Fruticutura, 21 (2): 186-190.

Hardarson, G. and C. Atkins, (2003). Optimization biological N_2 fixation by legume in farming system. Plant and soil, 225: 41 - 50.

Hashem, M.; Y. M. Omran, and M. Nashwa Sallam (2008). Efficacy of yeasts in the management of root-knot nematode (Meloidogyne incognita) in flame seedless grape vines and the consequent on the productivity of the vines. Biocontrol Science and Technology 18(4): 357-375.

Hanan A. E. A. Hashem (2016). Effect of Sowing Date and Fertilization Treatments on Growth and Chemical Constituents of Calendula officinalis Plants under North Sinai conditions. Middle East Journal of Agriculture Research. 5 (4): 761-774

Hafez, M.R., (2013). Effect of some biological components on Jerusalem artichoke (*Helianthus*
tuberosus L.) Productivity under North Sinai conditions. J. Appl. Sci. Res., 9(1): 804-810.

Hegab, M.Y.; F.F. Ahmed and A.H. Ali, (1997). Influence of spraying active dry yeast on growth and productivity of Valencia orange (Citrus sinensis). Producing of the 1st Scientific Conference of Agricultural Sciences, Faculty of Agric. Assuit Univ., Assuit, December 13- 14 vol. 1. 329 Middle East j. Agric. Res., 3(2): 318-329, 2014

Hegab, M.Y.; A.M.A. Sharawy and S.A.G. El-Saida, (2005). Effect of algae extract and mono potassium phosphate on growth and fruiting of Balady orange trees (*Citrus sinensis*). Proc. First Sci. Conf. Agric. Sci. Fac. of Agric., Assuit Univ., (1): 73-84

Ibrahim, T.M.A., (2009). Studies on the development and production of globe artichoke (*cynara scolymus,* L.) under Sinai conditions. M. Sci. Thesis. Fac. of Agric. Al-Azhar Univ. Cairo, Egypt

Idso, S. B; R. L. Garcia,; B. A. Kimball, and J. K. Hoober, (1995). Effect of atmosphere CO_2 enrichment and foliar methanol application on net photosynthesis of orange trees (*Citrus aurantium*) leaves. Amer. Botany 82(1): 26-30

Ipinmoroti, R. R.; G. O. Adeoye and E.A. Makinde, (2008). Effect of urea-enriched organic manures on soil fertility, tea seedling growth and pruned yield nutrient uptake. Bulgarian Journal of Agricultural Science. 14 (No 6), pp 592-597

Ishac, Y. Z. (1989). Inoculation with associative N_2-fixers Egypt. Nitrogen fixation with non-legumes, Kluwer Academic Publishers. Pp. 241-246.

Izquierdo, I.; M. Lescaille; B. Sandrino; M.J. Garcia; E. Canizares; J. Azcuy, M.E. Rodriguez and J.F. Gallardo, (1993). Effects of biofertilizers combinations on the availability of soil NPK to Citrus volkameriana seedlings. Actas del 12 Congreso latinoamericano de la Ciencia del Suelo, Salamanca, Sevilla (Espania) la 26 de Septiembre de, pp: 711-719

Jackson, N.L. (1967). In "Soil Chemical Analysis". Prentice-Hall Inc., Englewood Cliffs, New Jersy.

Joo, Y. H.; Y. I. A. Senanayake and I. R. Sangakkara, (1999). Effect of EM on the production of crops and waste treatment in korea. Fifth International Conference on kyusei Nature Farming, Bangkok, Thailand, 23-26 October, pp.151-156.

Khamis, M. A.; M. M.Sharaf; Kh. A. Bakry; H. K. Ebrahim and H. I. Yassin, (2012). Effect of Some Bio and Mineral Fertilizers on Growth, Productivity, Fruit Quality and Nutritional Status of Washington Navel Orange Trees. Egypt. J. of App. Sc., 4

Khamis, M. A.; M. M. Sharaf; Kh. A. Bakry and A.S. Abdel- Moty (2014). Response of Guava Transplants to Some Bio-Fertilizers. Middle East Journal of Agriculture Research, 3(4): 1184 -1188.

Khedr, Z.M.A. and S. Farid, (2000). Response of naturally virus infected tomato plants to yeast extract and phosphoric acid application. Annals of Agric. Sci., Moshtohor, 38(2): 927-939**.**

Krasilnikove, N. (1961). On the role of soil bacteria in plant nutrition. J. Gen. Applied Microbiol., 7: 128-144.

Mady, M.A., (2009). Effect of foliar application with yeast extract and zinc on fruit setting and yield of faba bean (*vicia faba* l). J. Biol. Chem Environ. Sci., 4(2): 109-127.

Magoffin, C. D. and R. C. Hoseney, (1974). A review of fermentation. Baker"s Dig. 48(12): 22.

Mahmoued, T.R., (2001). Botanical studies on the growth and germination of mahnolia (*Magnolia grandiflora* L.) plants. M. Sci. Thesis. Fac. of Agric. Moshtohor, Zagazig Univ., Egypt

Mahmoud, M. M.; M. A. G. Nadia; H. H. Abotaleb and S. f. Mansour (2006). Response of wheat plants to inoculation with diazotrophic bacteria under different levels and forms of mineral N-fertilizers in south Sinai soils. Egyptian Journal of Applied Sciences. 1110-1571

Mahvash Z. and A. Majid (2016). Evaluation of NaCl Salinity Tolerance of Four Fig Genotypes Based on Vegetative Growth and Ion Content in Leaves, Shoots, and Roots. HortScience Vol. 51 no. 11 1427-1434

Migahed, H. A. I. ; A. E. Ahmed and B. F. Abd EI-Ghany (2004). Effect of different bacterial strains as biofertilizer agents on growth, production and, oil of *Apium graveolens* under calcareous soil. Arab Universities Joumal of Agricultural sciences;.12(2):511-525.

Mitra, S. K., M. R. Gurung, and P. K. Pathak, (2012). Organic nutrient management in high density guava orchard, *Acta Hort.*, **933**: 233-38.

Mansour, A.E., (1998). Response of Anna apples to some biofertilizers.Egypt.J.Hort. 25, No.2.

Mansour, A.E.; G. H. Cimpoies and F.F. Ahmed, (2006). Application of algae extract and boric acid for obtaining higher yield and better fruit quality of Anna apple, Stiinta Agricola, (2): 14-20.

Martinez-Anoya; M. A., B.Pitarch; P. Bayarri and C. Beneditode barber, (1990 Microflora of the sour doughs wheat flour bread interaction between yeast and lactic acid bacteria in wheat dough's and their effects on bread quality. Cereal Chem. 6: 85.

Moustafa, M. H. (2002). Studies on fertilization of Washington navel orange trees. Ph.D. Dissertation Fac. of Agric., Moshtohor, Zagazig University, Benha Branch, Egypt.

Munns, R. and Tester, M. (2008). Mechanisms of salinity tolerance. Annual Review of Plant Biology, 59: 651-681.

Nautiyal, C. S.(1999). An efficient microbiological growth medium for screening phosphate solubilizing microorganisms. FEMS Microbiological Letters.170:265-270

Nijjar, G.S., (1985). Nitrogen of fruit trees. Mrs. Usha. Raji Kumar, Kalyani, New Delhi, India, pp: 306-308.

Osman, S. M.; M. A. Khamis and A. M. Thorya (2010). Effect of mineral and Bio-NPK Soil application on vegetative growth, flowering, fruiting and leaf chemical composition of young olive trees. Research Journal of Agriculture and Biological Sciences, 6 (1): 54-63.

Obreza, T. A. and M. O. Hampton (2000). Management of organic amendments in Florida citrus production systems. Fifty Ninth Annual Meeting of the soil and crop Science Society of Florida Sarasota, Florida, USA, Soil and Crop. Sci. Soci. of Florida, 59: 22-27.

Page, A. L.; R. H. Miller and D. R. Keeney (1982). In "Methods of Soil Analysis". Parts 2. American Society of Agronomy, Madison, W.1.

Paschoal, A. D.; Y. D. Senanayake and U. R. Sangakkara (1999): Improved soil chemical and physical conditions and their relations to yield and fruit quality of orange in a field under Kyusei Nature Farming and EM. Technology in Brazil. Fifth International Conference on Kyusei Nature Farming, Bangkok, Thailand, 23-26 October, 175-181

Rabeh, M. R. M.; B. Y. El-Koumey and A. A. Kasem (1993): Effect of organic fertilization and some micronutrients application on Balady mandarin trees. II- Yield and fruit quality. Zagzig J. Agric. Res., 20(6): 1865-1878.

Rengasamy, P. (2010). Soil processes affecting crop production in salt-affected soils, Australian Journal of Soil Research**,** 37: 613-620.

Saber, S. M. (1993). The use of multi-strain bio-fertilizer in agriculture. Theory and pratice. Proc. Sixth International Symposium on Nitrogen Fixation with Non-legumes, Ismailia, Egypt, p.61.

Shaban, A.E.A. and A.T. Mohsen, (2009). Response of citrus root stock and transplants to bio-fertilizers. Journal of Horticultural Science & Ornamental Plants, 1(2): 39-48.

Sheren A. A. El Hamied(2014a) Improving Growth and Productivity of "Sukkary" Mango Trees Grown in North Sinai Using Extracts of Some Brown Marine Algae, Yeasts and Effective Microorganisms 1- Mineral content of leaves and fruit growth aspects Middle East Journal of Agriculture Research, 3(2): 318-329, 2014

Sheren A. A. El Hamied (2014b) Improving Growth and Productivity of "Sukkary" Mango Trees Grown in North Sinai Using Extracts of Some Brown Marine Algae, Yeasts and Effective Microorganisms 2- Productivity and fruit quality Middle East Journal of Applied Sciences 4(3): 460-470, 2014

Soliman, M.G., (2001). Response of banana and guava plants to some biological and mineral fertilizers. M.Sc. Thesis, Fac. of Agric. Alex. Univ. Egypt.1144 – 1151.

Spencer, T.F.T.; S. M. Dorothy and A. R. W. Smith, (1983). Yeast genetics "fundamental and applied aspects" pp 16- 18, ISBNo-387-390973—9, Springer. Verlag. New Yourk .,U.S.A.

Stephen, F. and E. V. Nybe, (2003). Organic manure and biofertilizers on nutrients availability and yield in blank pepper. Journal of Tropical Agriculture 41:1/2. 52 – 55.

Subba Rao, N.S., (2008). Biofertilizer in Agriculture. Oxford IBH Company, New Delhi

Taha, M.W.; A. H. Shahein and A.M. Attalla, (1989). Agriculture Organization of the United Nations, trees grown along the North-Western coast of Egypt in relation to irrigation and pruning trials. Alex. J. Agric. Res., 34(2): 55-66.

Xie, H.; J.J. Pasternak and B.R. Glick (1996). Isolation and characterization of mutants of the plant growth-promoting rhizobacterium Pseudomonas putida GR12-2 that overproduce indoleacetic acid. Curr. Microbiol., 32: 67-71.

Zahir, Z. A.; M. Arshadand and W. T. Frankenberger, (2003). Plant growth promoting rhizobacteria: applications and perspectives in agriculture. Adv. Agron., **81**: 97- 168.

تحسين نمووانتاجيه التين بواحه سيوه

شيرين عادل عبد الحميد

قسم الانتاج النباتى- مركز بحوث الصحراء-القاهره- مصر

أجريت هذه الدراسة خلال موسمين متتاليين في عام 2016 و 2017 في المزرعة البحثية بمحطه خميسه -مركز بحوث الصحراء بواحة سيوة - محافظة مطروح - مصر على صنف التين كونادريا النامى فى ظروف ملحيه لدراسة تأثير بعض المركبات البيولوجية (البيوماجيك والخميرة و البيوفيت) على تحسين الإنتاجية.وذلك بتطبيق أربعة معاملات للرش الورقى(م1) : الرش بماء الصنبور ،(م2) : البيوفيت بتركيز 7.5٪ ، (م3):مستخلصات الخميرة بتركيز 5جم/لتر ، (م4) :البيوفيت بتركيز 7.5% + مستخلص الخميره بتركيز 5جم/لتر تم الرش مرة واحدة كل شهرين بدءا من يناير حتى وقت الحصاد. بالإضافة إلى ذلك ، تم تلقيح التربة بالبيوفيت في منطقة الريزوسفير مع مياه الري بثلاث معدلات من البيوفيت (ب1): بدون،(ب2)بيوفيت بمعدل 100 مل/ شجره و(ب3) بيوفيت بمعدل 200 مل/ شجره بتركيز 1% مرتين في (يناير ومارس).وقد اوضحت النتائج أن جميع المعاملات كانت فعالة جداً في النمو الخضرى والمحصول (عدد الثمار والأوزان) لكل من "المحصول البوني" و "المحصول الرئيسي" والمحصول الكلى بالإضافة إلى الخصائص الفيزيائية والكيميائية للثمار. .بشكل عام ،ادت المعامله (م4) مع المعامله (ب3) الى زياده طول الفرع ، عدد الأوراق ، مساحة الورقة ، الكلورفيل الكلى ، عدد الثمار لكل من محصول البوني والمحصول الرئيسي و العدد الكلي للثمار، وزن الثمار لكل من محصول البوني و المحصول الرئيسي والمحصول الكلي ، وزن وارتفاع وقطر الثمره، المادة الصلبة الذائبة الكلية ، السكريات المختزله وغير المختزلة والكلية وانخفاض الحموضة الكلية في كلا الموسمين .هذا ومن الواضح أيضًا أن معامله (ب 3) قد زادت مع نمو الكائنات الدقيقه بالتربه لتصل الى اعلى رقم لها بعد 90 يوم من الحقن . كذلك ادت المعامله (ب3) الى انخفاض فى درجة حموضه التربه و EC، Na، Cl في التربة في نهاية كل موسم.