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Response of Canino apricot trees to different sources of bio-organic fertilization

Nevine M. Taha[1] and R. M. El-Shahat[2]
[1]Horticulture Research Institute, Agriculture Research Center, Egypt.
[2]Soils Water and Environment Research Institute, Agriculture Research Center, Egypt

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ABSTRACT

The present study was performed during the two successive seasons of 2014 and 2015 on "Canino" apricot (*Prunus armenica*) trees of ten years old grown in a new reclaimed sandy soil in a private orchard at El-Khtattba, El-Monofia Governorate. Evaluation to different sources of bio and organic fertilizers were performed through the shoot length, shoot diameter, number of leaves and chlorophyll content were following recorded. In addition to, some fruiting parameters i.e. number of flowers/spur, fruit set (%), fruit weight (g), yield/tree and TSS/acid ratio. Dehydrogenase activity, CO_2 evolution, total nitrogen, available P and K in soil, the leaf contents N, P, K, Zn, Fe and Mn in dry matter of dry leaves were also determined. Results showed that organic fertilizer treatments used with recommended dose in this study improvement markedly both vegetative growth, fruit set, fruit weight, yield and fruit quality. Also, all sources of bio-organic fertilizers observed that storage studies on "Canino" apricot fruits showed that highest fruit ability for keeping quality for 30 days in cold storage at 0 °C and 90 % R.H. and 8 days of shelf life at room temperatures (20 -25 °C) was also studied. Algae treatment was the most effective one for increasing shoot length, diameter, leaf number and chlorophyll, chicken manure extract followed in descending order. Algae, chicken and cattle manure extract recorded the highest fruit set, yield and fruit weight. The results cleared that using different sources of bio-organic fertilizers improved TSS which was in parallel decreased acidity in fruit juice. All treatments improved storage properties under the shelf life (room temperature) during eight days, Nile fertile recorded the highest value of the weight loss. On the other hand, chicken manure and algae recorded the least fruit weight loss. The same results were noticed with fruit firmness. TSS % was differ among treatments and led to increase through storage eight days at shelf life but at cold storage (0°C) SSC increase gradually prolonged tell 20 days then reduction in SSC % occur at the last ten days in both seasons. Algae, chicken and cattle extract effectively were superior than all other treatments. Soil biological activity in rhizosphere (total bacteria counts, dehydrogenase as well as CO_2 evolution showed a positive response with bio-organic fertilizers. Soil application of algae, compost tea and Nile fertile extract led to increase the soil WHC, organic matter (OM %), pH and TN and decrease EC compared to control.

Keywords: Canino, organic fertilizers, growth parameters, yield, quality and storability.

INTRODUCTION

"Canino" is the main apricot cultivar that widely grown in Egypt. Apricot planted area in Egypt was 16433 faddan in 2013 and the production 98772 ton (Ministry of Agriculture Statistics). Organic manures can serve as alternative to mineral fertilizers for improving soil structure (Dauda *et al*., 2008) and reduce pollution. Towards to keep and build good soil fertility, increase long-term soil fertility, organic fertilizer, in comparison to chemical fertilizers have lower nutrient content and are slow release but they are as effective as chemical fertilizers, over longer periods of use (Naguib, 2011).

Algal extract is one of the potential organisms, are rich source of several fine chemicals such as vitamins, carotenoids, polycobiliprotein, polysacharides, fatty acids, etc. with varied properties like antioxidant (El-Baz *et al*., 2002, Abd El-Baky *et al*., 2003). Molnar and Ordog (2005) microalgae stimulated the growth of plants, due to the presence of auxine, cytokinins, gibberellins. The various positive effects of applying Algae extract were attributed to its content of different nutrients with higher percentage of N, greater amounts of B_1, B_2 and B_6 vitamins and the natural plant hormone like cytokinins (Dahama, 1999). Abd El-Baky *et al*., (2008) stated that application of algal extracts significantly increased the contents of total chlorophyll and antioxidants. In addition, exhibited increase in grain weight and yield components of wheat plant.

Abou Hussein *et al*., (2002) concluded that adding chicken manure (dry or extract increased plant growth, total yield, dry matter and total carbohydrates on potato. This effect may be due to that the chicken manure increased supply of P and K to the soil by 100 % and 90 % N in the first season (Pratt *et al*., 1973; Mathers and Goss 1979). Also, chicken manure extract has much higher nitrogen which give strong growth and yield. Ragab *et al*., (2010) reported that fertilization with the high rate (40 m^3/fed.) of chicken manure extract recommended the highest number of leaves/plant, chlorophyll content roots length, total yield and fruit quality in strawberry plant.

Fayed (2005) found that cattle manure on "Anna" apple trees increased leaf macro elements (NPK) as compared with control. Luévano and Velázquez (2001) showed that cattle manure include high proportions of N, K medium proportions of Ca, P and low of Mg and S.

Compost tea is emerging, as a crop protection tool in organic agriculture, it contents microorganisms, produce plant hormones and available nutrients (extracted from compost). (Al-Kahal *et al*., 2009). Compost tea, exhibited a better N availability to wheat than urea and it could act as a partial substitute nitrogen source for many plants (Hanna *et al*., 2013). Compost tea or liquid fertilizer has benefit for growing plants, Richard and John, (1998) show that organic tea not only dissolve important nutrients, but with given enough time and O_2, they can also extracts humic acid, organic nutrients, vital enzymes and beneficial microbes, all of which make for a more vigorous plant.

Nile-fertile (NF) is a locally produced commercial fertilizer that contents 2.7 N, 3.5 % P_2O_5, 5.0 % CaO_3, 38 % S, 2.7 % MgO, and 1 % Fe in addition to sulphur oxidizing microorganisms, with the

objective of reducing soil pH. (Eissa, 2008). As for concerning soil amendments with (NF) recorded the highest significant in number of leaves/seedling, leaf area, chlorophyll content, foliage and main root dry weight, the highest total count of actinomycetes and resulted the least soil pH in both seasons on Anna apple seedlings. Ibrahiem (2003) found that fertilizing the vines by Nile-fertile (263 g/vine) gave the highest yield and best quality of berries of "flame seedless" grapevines. Rizk-Alla and Tolba (2010) revealed that, adding Nile fertile (NF) at 200 g/vine under the calcareous soils obtain the highest yield besides improving the fruit quality and improving microbiological activity.

Moreover, Stino *et al*., (2009) indicated that mineral fertilization significantly improved values of all tested parameters compared with all treatments in the first season. While in the second one, high levels of the organic fertilizer (100 or 150% Compost) in combination with both bio fertilizers reflected best results with regard to vegetative growth parameters. This revealed promoting effects of both bio fertilizers. Herein, Yona, (2007) indicated that organic fertilization plays an important role in the soil micronutrient cycle. Also, Salem *et al*., (2010) mentioned that sandy soils considered very poor in organic matter that have low cation exchange and low water holding capacity which lead to more losses of fertilizers through leaching. Moreover, Zhao *et al*., (2011) revealed that the tested organic fertilizers had a good effect on improving soil organic matter content, remaining higher soil moisture, keeping balance of all elements, soil capacity of nutrient supplying, all those contributed to the better growth condition of the young pear tree.

The aim of this study is to evaluate the possible effects of different sources of bio-organic fertilizers (Algae extract, chicken manure extract, cattle manure extract, compost tea and Nile fertile) on vegetative growth, nutritional status, yield, fruit quality at picking date and after storage of "Canino" apricot grown on sandy soil. Allover, the goal is to improve productivity, quality and enhancing biological soil fertility.

MATERIALS AND METHOD

This study has been carried out during the consecutive seasons of 2013, 2014 and 2015 on "Canino" apricot (*Prunus armeniaca*) trees grown in new reclaimed sandy soil in a private orchard at El-Khtattba, El-Monofia Governorate. Trees were ten years old, irrigated under drip irrigation and planted at 5 x 5 meters apart, nearly similar in their growth vigor and fruiting, free from any visual disease symptoms and receiving regularly the recommended orchard management except mineral nitrogen amount/tree. Eighteen apricot trees were chosen to study the effect of organic extracts. Also, the experiment contained three trees in each treatment and each tree treated as one replicate.

Soil properties:-

The physical and chemical properties of the experimental soil are presented in Table (1).

Table 1. Physical and chemical properties of the experiment soil.

Mechanical analysis (%)					pH	EC. (dS/m)	Total $CaCO_3$ (%)	Cations (meq/100 g soil)				Anions (meq/100 g soil)		
Coarse sand	Fine sand	silt	clay	Texture				Na^+	K^+	Ca^{++}	Mg^{++}	HCO_3^-	Cl^-	SO_4^-
9.3	81.15	9.31	0.24	Sandy	8.1	1.20	2.20	0.1	0.70	1.30	1.40	2.10	1.18	0.22

Different bio-organic fertilizers types were used: control, Algae extract, chicken manure extract, compost tea, cattle manure extract and Nile fertile compost. The analysis of different types of bio-organic fertilizers was presented in Table (2).

Preparation of different organic extracts:-

To prepare aerated the different organic extracts (chicken manure, cattle manure, compost tea and Nile fertile compost were suspended in a barrel of water for 15 days to produce compost extract. A 50 L tank is fitted with air bubbles that are produced by an aquarium type aeration pump (**Ingham, 2005**). The tank which half filled with water and air was passed through it for approximately 10-20 minutes from the pump .Compost extract is added to fill the tank .The aerator provides continuous flow of air. It was taken 1500 g from different sources of organic to prepare the liquid extract for each treatment (3 trees).

Preparation of algae extract:-

Algae was kindly obtained from Agric. Microbiology Res. Dep., Soils, Water and Environment Res. Ins. (SWERI), Agric, Res. center (ARC). Algae was hardly crushed and blended till obtaining a suspension that was filtered through a sheet of cotton cloth and the obtained filtrated was used as soil application of Algae extract elements.

Table 2. Analyses of the different treatments as follow.

Organic types	Moisture Content (%)	Total N %	OM %	C/N ratio	P %	K %	Fe ppm	Mn ppm	Cu ppm	Zn ppm
Algae extract	7.55	33.90	73.30	3.20	6.18	18.25	1.06	303.80	76.00	225.0
Chicken manure extract	22.15	20.18	50.17	11.35	0.73	1.25	0.65	190.22	86.00	30.11
Cattle manure extract	23.45	19.75	46.70	13.20	0.60	1.30	1750	125	122.0	6.0
Compost tea extract	29.00	10.15	40.11	41.40	0.60	1.10	1400	100	130.0	40.0
Nile fertile compost extract	28.50	13.35	40.22	46.30	3.90	1.20	1	3.10	1.50	2.4

The treated trees were similar in their vigor and shape as possible, the selected trees (18) were received the following treatments:

1. Control, the mineral recommended dose of the farm supplemented throw the fertigation system was: Ammonium nitrate (33.5% N) 150 Kg/100 trees, Calcium mono phosphate (15.5% P_2O_5) 45 K/100 trees, Potassium sulphate (48% K_2O) 100 Kg/100 trees.
2. Algae extract (50 g/tree).
3. Chicken manure extract (500 g /tree).
4. Cattle manure extract (500 g /tree).
5. Compost tea extract (500 g /tree).
6. Nile fertile extract (500 g /tree).

Treatments were applied as a direct soil application on the tree canopy (around the trunk), four times per season (at the start of growth "mid February", just after fruit set "mid March", one month before harvest "1/2 April", after harvest "the end of June". The following data were recorded throughout 2014 and 2015 seasons, while 2013 was considered as a preparatory season.

1- Vegetative growth:-

Four main shoots in around tree were chosen and tagged at their cardinal points. Length (cm) and diameter (cm) of each selected shoot were measured at the end of each season. Number of leaves per shoot and chlorophyll recording during the two growing seasons.

2- Fruit parameters.

Fruit set percentage: number of flowers/spur and set fruitlets on the tagged branches were counted and recorded in all treatments, fruit set %, was estimated by the following equation according to Westwood (1978).

$$\text{Fruit set (\%)} = \frac{\text{Number of set fruitlets}}{\text{Total number of flowers}} \times 100$$

Fruit yield:

Yield was estimated as Kg /tree at maturity stage in the end of May.

3- Fruit characteristics: at the Picking time, 30 fruits from each treatment were taken randomly and the following fruit characteristics were estimated including fruit physical properties such as fruit weight (gm.), volume (ml^3), fruit dimensions (height and diameter in cm.), fruit shape index (fruit height/diameter ratio) and fruit firmness ($Ib/inch^2$) using a Magness and Tayler pressure tester with 7/18 inch plunger. Fruit seed weight, flesh diameter and flesh weight: flesh weight percentage were estimated as A.O.A.C. (2005). As well as, fruit chemical properties including the average of fruit juice TSS % by handy refractometer, total acidity as malic acid according to Vogel (1968) and A.O.A.C. (2005) and TSS/acid ratio was estimated was determined using the method of A.O.A.C. (2005).

II- Fruit storability:-The loss of fruit weight %, firmness ($Ib/inch^2$), soluble solid content (%) and acidity (%) were determined in "Canino" fruits and recorded periodically first at shelf life at room temperature for eight days and second cold storage at 0 °C and 90 % RH for 30 days with 10 days intervals.

3- Determination of microbiological composition:

The initial and rhizospheric soil samples collected before drying were used directly for the determination of total viable bacteria applying serial dilutios and plate count CFU/g dry soil using ,the medium of soil extract agar (Allen,1959), carbon dioxide CO_2 evolution (Gaur *et al* ., 1971) dehydrogenase enzyme (DHA) (Casida *et al*., 1964). The soil sample was air dried and exposed to physical and chemical analyses according to the slandered methods ,i.e. soil organic matter (Black, 1986) pH and EC.

Soil samples were taken at the end of seasons 2014 & 2015 and tenfold dilution of soil samples were prepared in sterile fresh water. These dilutions were subjected to microbiological analysis

4- Chemical determinations: -

Soil samples: -

Total nitrogen was determined in soil using Kjldahl digestion method as described by Jackson (1973). Available phosphorus in soil samples was determined according to Murphy and Riley (1962) and available potassium was determined according to Sardinha *et al*., (2003). Ca, Mg, Na, S and Cl contents were determined against a standard, using air propane Flam photometer (Chapman and Pratt, 1978).

Determination of leaf mineral composition: -

Leaf minerals contents were determined in August of both seasons. Samples of 30 leaves /tree were taken at random from the previously tagged shoots of each tree. Leaf samples were washed with tap water and distilled water twice, dried at 70^{o}C to a constant weight and then ground. The ground samples were digested with sulphoric acid and hydrogen peroxide according to Evenhuis and Dewaard (1980). Total nitrogen and Phosphorus were determined colorimetrically according to Evenhuis (1978) and Murphy and Riley (1962), respectively. Potassium was determined by a flame Photometer model E.E/L. (Jackson, 1973). Fe, Zn and Mn were determined by Perkin-Elmer atomic absorption spectrophotometer model 2380 Al, according to Jackson and Ulrich (1959) and Yoshida et al. (1972).

The present treatments were arranged in a complete randomized block design. Data were statistically analyzed according to the method of Snedecor and Cochran (1990) in each L.S.D at 5% level for comparison between means of each treatment.

RESULTS AND DISCUSSION

Vegetative growth:

The data of different types of bio-organic fertilizers: Algae, chicken manure, cattle manure, compost tea and Nile fertile on "Canino" apricot trees during 2014 and 2015 seasons are presented in Table (3). Data shows that all mentioned treatments clearly affected vegetative growth (mostly significant) than control. However, Algae treatment was the most effective of increasing shoot length (62.43 and 71.5 cm) shoot diameter (0.71 and 0.72 cm) leaves number (76.33 and 80.53) and chlorophyll (42.6 and 41.92 SPAD). Moreover, chicken manure extract followed Algae in descending order while control treatment attained the least vegetative growth attributes. Similar results were found by Abd El-Baky (2003) who reported that the highest increased in total content of chlorophyll and the plant growth by spraying with Algae extract. Ragab *et al*., (2010) found that, the highest number of leaves/plant and chlorophyll content by fertilized with the highest rate of chicken manure. Moreover, shoot length and shoot diameter go in the same trend compared with untreated trees. The positive effect of organic fertilizers applications may be due to the fact that organic fertilizers had a prevalent action in plants and involved in maintenance of ionic balance in cell and bind ionically to many enzymes which are involved in respiration and carbohydrate metabolism.

The obtained results could be cleared the effect of different sources of organic fertilizers and Nile fertile on enhancing the metabolism processes of

carbohydrates as well as its effect in reducing soil pH which by their turn could be responsible for increasing the availability of nutrients. Nile fertile is able to absorb and translocation elements to host root tissues (Rizk-Alla and Tolba, 2010). This not only allows the plant to overcome phosphorus depletion from the zone around the root, but also allows it to reach immobile phosphorus that the fungus can solubilize. This phenomenon is most apparent in soils low in phosphorus, (Zarb and Litterick 1999). The obtained results are nearly similar to those achieved by several investigators who reported that bio-fertilizers many enhances these contents. In addition, some researcher found that organic fertilizers increased chlorophylls content of leaves and increased carbohydrate content of canes and leaf mineral content El-Shenawy and Fayed (2005) on "Crimson seedless" grapevine growth as main shoot length, leaf area and cane thickness were increased after application of organic and bio fertilizers compare to chemical application.

Table 3. Effect of different sources of bio-organic manure treatments on leaf number, shoot length (cm), shoot diameter (cm) and chlorophyll content on" Canino" apricot tree during 2014 and 2015 seasons

Treatments	Shoot length (cm)		Shoot diameter (cm)		Leaves number		Chlorophyll (SPDA)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	45.50d	60.00e	0.45d	0.55d	41.17e	73.60b	35.00e	37.03c
Algae extract	62.43a	71.50a	0.71a	0.72a	76.33a	80.53a	42.60a	41.92a
Chicken manure extract	58.67b	69.67ab	0.70ab	0.66b	73.93ab	81.50a	41.20b	40.97b
Cattle manure extract	58.43b	66.83bc	0.62bc	0.65bc	69.43bc	81.33a	39.67c	39.67b
Compost tea extract	55.17bc	65.00cd	0.60c	0.64bc	67.47c	74.50b	39.00cd	39.70b
Nile fertile extract	53.50c	62.50de	0.57c	0.60cd	54.17d	74.33b	38.63d	37.13c

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Flowering and Yield:-

Results in Table (4) show the effect of the present treatments on number of flowers/spur, fruit set % and fruit yield of "Canino" apricot trees. Algae, chicken manure and cattle manure extracts were the most effective treatments of increasing flowering and yield components than control (2.41 and 2.80 flowers/spur), (2.75 and 3.11 % fruit set) as well as (58.5 and 61.0 kg fruits/tree). Moreover, compost tea and Nile fertile extracts were less effective than the other treatments. Autio *et al*., (1991) stated that organic fertilizers on apple orchard soils were erective in growth, blooming and fruit yields. Ataweia *et al*., (2011) on Washington Navel orange improved fruit set, fruit retention and number of fruit/tree by spraying Algae extract 2%. Also, Chicken manure extract increased total yield in strawberry plant Ragab *et al*., (2010). Clearly show that Alga extract tended to produce the highest yield in both seasons of study (89.9, 97.5 Kg/tree), followed by chicken manure extract (79.90, 88.40 Kg/tree), respectively. Using Algae extract, chicken manure extract, compost tea, cattle manure extract and Nile fertile extract in descending order was significantly very effective in enhancing flowering, fruit set and yield. This result may be reflected the effect of organic fertilizers on improving yield as well as fruit set and number of flowers. Another interpretation of the positive role of organic fertilizers in increasing flowers number and fruit set, which lead to increase in yield. This effect might be due to that applying biofertilizer increased microorganisms content in the soil, which convert the ability of mobilizing the unavailable forms of nutrients elements to available forms (Ishac, 1989). Moreover the second season presented a higher level in flowering, fruits set and yield in compared with the first season. This results was in agreement with those of Naguib (2011) who stated that, organic fertilizer in comparison to chemical fertilizers have lower nutrient content and slow release but they are as effective as chemical fertilizers, over longer periods of use.

The present results are in agreement with El-Shenawy and Fayed (2005) as organic and biofertilizers were effective in number of cluster per vine, cluster weight and yield per vine on "Crimson seedless" grapevine. Also, Gawad *et al*. (2012) on biofertilizer as Nitrobeine as it gave positive action in improving vine productivity, this may be attributed to reducing plant requirements of N, improving the availability of carbohydrate content of grapevine in canes and reducing pollution induced by the application of chemical fertilizers.

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Table 4. Effect of different sources of organic fertilizers treatments on number of flowers/spur, fruit set and yield on" Canino" apricot tree during 2014 and 2015 seasons

Treatments	Number of flowers/spur		Fruit set (%)		Yield/tree (Kg)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	2.41c	2.80c	2.75d	3.11d	58.50d	61.00d
Algae extract	3.62a	4.33a	17.95a	19.37a	89.90a	97.50a
Chicken manure extract	3.57a	3.60b	18.27a	18.80a	79.90b	88.40b
Cattle manure extract	3.27ab	3.60b	11.67b	16.70a	66.50c	69.70c
Compost tea extract	2.93b	3.53b	10.82b	13.20b	64.90cd	67.30c
Nile fertile extract	2.43c	3.50b	5.72c	6.57c	64.00cd	64.50cd

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Fruit physical properties:

It is clear from the data in Tables (5 and 6) that different types of bio-organic fertilizers significantly resulted in improving fruit quality in terms of increasing fruit weight (g), fruit volume (cm^3), fruit diameter (cm) and fruit length, as well as fruit firmness ($Ib/inch^2$) in relative to the control with a few exceptions. Algae followed by chicken manure soil application treatments have significantly the highest fruit weight, size, length and diameter, while cattle manure extract occupied significantly intermediate position in the both seasons. Also, Algae, chicken manure and cattle manure

significantly maintained apricot firmness than the other treatments and control.

The beneficial effect of these types of bio-organic fertilizers on flowering, fruit set and yield could be attributed to its vital role in lowering soil pH. Consequently, vegetative growth and nutritional status are being improved fruit weight (g), increasing yield (Kg) and improved both physical properties of fruits. The obtained results are in agreement with those reported by Zhu and Zhu (2000) and Atawia *et al*., (2011) who found that different sources of organic fertilizers applications significantly increased fruit physical properties. Spraying Algae extract 2 % recorded the greatest fruit weight, size, juice volume in Washington navel orange. The highest rate (40 m^3/ feddan) of chicken manure showed the highest yield, fruit firmness, TSS and V.C on strawberry (Ragab *et al*., 2010).

Table 5. Effect of different sources of organic manure treatments on fruit weight, fruit size and fruit firmness on "Canino" apricot tree during 2014 and 2015 seasons

Treatments	Fruit weight (g)		Fruit size (cm^3)		Fruit firmness ($Lb/inch^2$)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	39.50c	50.30d	29.20c	31.27d	10.33e	11.60d
Algae extract	54.33a	62.33a	41.67a	52.50a	17.31a	18.27a
Chicken manure extract	52.70a	56.60b	37.67b	39.67b	16.05b	17.80a
Cattle manure extract	46.73b	55.80b	35.10b	36.87bc	15.45b	17.40ab
Compost tea extract	45.67b	53.10c	34.93b	35.67c	14.00c	15.29b
Nile fertile extract	44.97b	51.00d	34.57b	34.60cd	11.75d	12.93c

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different

According to data in Table (6), was noticed a significant differences between different types of bio-organic fertilizers were observed in fruit length and fruit diameter. The best fruit dimensions recorded with treatments bio-organic fertilizers algae extract, chicken manure extract and cattle manure extract in both seasons under study, respectively. The present data in the same table showed that, Algae, chicken manure and cattle manure as well as compost tea significantly affected apricot fruits to form smaller seeds subsequently better flesh: fruit percentage than control or Nile fertile extract. Also, Algae extract significantly increased the flesh diameter than control and the other treatments. The results are in agreement with those reported when mineral N fertilizer was replacement by using algae biofertilizer on "Florida Prince" peach (El-Khawaga, 2011). Also, same results were found when used bio-stimulants on "Desert Red" peach and "Anna" apple trees (Fathi *et al*., 2002). Moreover, these results are in parallel with those of applying organic fertilizers (Eissa *et al.* 2003) on "Canino" apricot and Shaddad *et al*., (2005) and Kabeel *et al*., (2008) on "Le-Conte" pear and Ismail *et al*., (2003) on 'Thompson seedless' and 'Roomy Red' grape cultivar .

Table 6. Effect of different sources of organic manure treatments on fruit length, fruit, diameter, flesh diameter, seed weight and flesh (%) on "Canino" apricot tree during 2014 and 2015 seasons.

Treatment	Fruit length (cm)		Fruit diameter(cm)		Seed weight(g)		Flesh(%)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	1.83c	1.93d	1.80c	1.93d	2.60a	2.57a	93.40d	94.93c
Algae extract	2.67a	2.90a	2.67a	2.97a	1.90d	1.60d	95.74a	97.16a
Chicken manure extract	2.65b	2.83a	2.67a	2.83a	2.08c	2.13c	95.45b	95.96b
Cattle manure extract	2.30b	2.73ab	2.47b	2.67ab	2.37b	2.33b	95.50b	95.77b
Compost tea extract	2.40b	2.60bc	2.50b	2.60bc	2.40b	2.37b	95.55ab	96.77b
Nile fertile extract	1.78c	2.53c	2.52b	2.53c	2.50ab	2.43ab	94.65c	95.15c

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different

Chemical characteristics of fruits

The results presented in Table (7) revealed that all chemical characteristics of fruits such as total soluble solids, titratable acidity and TSS/acid ratio were significantly affected by different types of bio-organic fertilizers treatments in the both seasons. On the other hand, control recorded the lowest values of total soluble solids and TSS/acid ratio in the both seasons as well as the highest acidity.

From the results, it's clear that using different types of bio-organic fertilizers improved significantly T.S.S synthesis which in parallel decreased acidity in the fruits/ juice. This explanation is in the line with using bio stimulants which significantly improved T.S.S synthesis and decreased acidity (Abd El-Ghany *et al*., 2001, Ismail *et al*., 2003, Gaser *et al*., 2006, Abd El Moniem and Abd Allah 2008, Abd El-Motty *et al*., 2010, Ahmed *et al*., 2011). The results are also in agreement with those obtained when replacement mineral N fertilizers by using humic acid and algae biofertilizer on Florida Prince peach (El-Khawaga, 2011).

Table 7. Effect of different sources of organic manure treatments on T.S.S, acidity and TSS/ acidity on "Canino" apricot tree during 2014 and 2015 seasons

Treatment	T.S.S. (%)		Acidity (%)		T.S.S./Acidity	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	11.50d	12.23c	0.97a	0.83c	11.86de	18.82e
Algae extract	13.33a	14.70a	0.67d	1.07a	19.90a	29.40a
Chicken manure extract	12.80ab	14.60a	0.73c	1.07a	17.53b	27.55b
Cattle manure extract	12.50bc	13.90b	0.83b	0.80c	15.06c	26.23bc
Compost tea extract	12.40bc	13.90b	0.87ab	0.93b	14.25cd	20.75c
Nile fertile extract	12.00cd	13.63b	0.97a	1.05a	12.37d	19.47d

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

II- Fruit storability (shelf life).

Obtained data showed that, the storage characteristic parameters of "Canino" apricot as affected by different types of bio-organic fertilizers in two seasons under study. The data revealed that, all treatments improved the storage properties parameters under shelf life or at 0 ˚C and 90 % RH compared to the control, but we can remarked the fruit remained till the end of storage was less in quality .

Apricot is perishable fruit having storage life (3-5 days) at ambient conditions, 2-4 weeks at cold storage, depending on variety (Ishaq *et al*., 2009). The short storage life of this fruit is due to short time period from commercial ripening to the degradation process characteristic like senescence (Egea *et al*., 2007).

Effect of different sources of bio-organic fertilizers on fruit characteristics on shelf life conditions:-

Data in Table (8) demonstrated that there was a significant difference observed between different types of bio-organic fertilizers. It is noticed that control and Nile fertile treatments recorded the highest interaction values of the weight loss during the 8 days of shelf life conditions compared with all treatments in two seasons under study. On the other hand, chicken manure and Algae treatments recorded the least fruit weight loss (20.99 and 30.09 %) in the 1st season while cattle manure and Algae treatments induced the least weight loss in 2nd season (13.43 and 16.12 %), respectively. The obtained results are in agreement with those obtained by El-Badawy and El-Salhy (2011) and Ezzat *et al*. (2012). This trend differed between different types of bio-organic fertilizers in behavior of storage ability which cleared by the term of the parameter under study refer to differences in agriculture treatments pre harvest (Ezzat *et al*., 2012). It is noticeable that, fruit weight loss significantly increased with increasing storage shelf life up to 8 days (0.0, 21.66 and 43.88 %) in 2014 as well as (0.0, 9.49 and 25.8 %) in 2015 seasons, respectively.

Table 8. Effect of different sources of bio-organic fertilizers treatments on weight loss during the shelf life of " Canino" apricot 2014 and 2015 seasons.

Treatments	Weight loss (%)							
	First season				Second season			
	Zero Time	After 4 days	After 8 days	M	Zero time	After 4 days	After 8 days	M
Control	0.00i	30.12d	49.73a	39.93A	0.00h	8.80f	31.01a	19.91A
Algae extract	0.00i	15.17g	45.03b	30.09C	0.00h	8.81f	23.52d	16.12C
Chicken manure extract	0.00i	27.29e	44.06bc	20.99D	0.00h	10.89e	25.39c	18.14B
Cattle manure extract	0.00i	23.00f	48.24ab	35.62B	0.00h	7.90g	18.96e	13.43D
Compost tea extract	0.00i	22.70f	45.92b	34.31B	0.00h	10.17ef	25.89c	18.02B
Nile fertile extract	0.00i	11.69h	30.29d	35.67B	0.00h	10.47e	30.02b	20.24A
Mean	0.00C	21.66B	43.88A		0.00C	9.49B	25.80A	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Firmness (lb/inch^2).

Data revealed that all different types of bio-organic fertilizers decreased fruit firmness. Data presented in Table (9) indicated that storage under shelf life conditions resulted in fruit softness after 8 days recording by control and Nile fertile extract in the two seasons. While Algae, chicken manure and cattle manure were the highest firmness with significant decreasing order in two seasons under study respectively. Also, apricot fruits significantly lost their firmness during shelf life from 14.13 to 8.45 to 2.58 lb/inch^2 as well as from 15.65 to 9.29 to 2.82 lb/inch^2 through the two studied seasons, respectively.

Table 9. Effect of different sources of bio-organic fertilizers treatments on firmness during the shelf life of "Canino" apricot 2014 and 2015 seasons

Treatments	Firmness (lb/inch^2)							
	1st season				2nd season			
	Zero Time	After 4 days	After 8 days	Mean	Zero Time	After 4 days	After 8 days	Mean
Control	10.33g	7.33K	1.67q	6.45F	11.60g	8.13k	1.43r	7.05F
Algae extract	17.00a	10.67F	3.00m	10.22A	18.27a	11.67f	3.40m	11.11A
Chicken manure extract	16.13b	10.00H	3.00m	9.71B	17.80b	11.13h	3.27n	10.73B
Cattle manure extract	15.67c	8.33I	2.87n	8.95C	17.40c	13.30j	3.13o	9.80C
Compost tea extract	14.00d	8.00J	2.53o	8.18D	15.73d	13.40i	2.93p	9.20D
Nile fertile extract	11.67e	6.33I	2.40p	6.80E	13.07e	10.50l	2.82q	7.61E
Mean	14.13A	8.45B	2.58C		15.65A	9.29B	2.82C	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

TSS (%).

It is clear from data in Table (10) that TSS was differ between different sources of organic fertilizers at harvest and gets to increase significantly through storage period prolonged from initial day to 8 days in both seasons. The increase in fruit TSS content during storage may be attributed to the reduction of fruit moisture content, degradation of complex insoluble compounds to simple soluble compounds and accumulation of soluble solids particularly. However, Algae, chicken and cattle manure effectively were superior than control and other treatments.

Table 10. Effect of different sources of bio-organic fertilizers treatments on TSS during the shelf life of " Canino" apricot 2014 and 2015 seasons

Treatments	TSS (%)							
	1st season			Mean	2nd season			Mean
	Zero time	After 4 days	After 8 days		Zero time	After 4 days	After 8 days	
Control	11.50l	14.60g	17.30a	14.47C	12.80i	14.70i	16.40c	14.63E
Algae extract	13.43h	15.07e	16.40d	14.97A	14.60i	16.90a	15.50gh	15.67A
Chicken manure extract	12.77i	14.93ef	16.73c	14.81B	14.20j	16.60b	15.70ef	15.50B
Cattle manure extract	12.43j	14.93ef	16.97b	14.78B	13.90k	16.30c	15.80e	15.33C
Compost tea extract	12.50j	14.87f	16.80c	14.72B	13.80k	15.60fg	15.40h	14.93D
Nile fertile extract	11.87k	14.50g	17.17a	14.51C	13.30l	15.40h	16.10d	14.93D
Mean	12.42C	14.82B	16.89A		13.77C	15.92A	15.82B	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Total acidity (%).

The maximum value of total acidity was resulted for different types of bio-organic fertilizers which was lower than the acidity of control. The maximum mean value of acidity recorded for overall during storage period in both seasons, respectively, increased at 8 days. These results agree with several others, the increase in fruit acidity during storage period may be due to the metabolic changes in fruits or due to the use of organic acids in respiratory process (Echeverria and Valich, 1989) and Sarfaraz *et al*., (2014). Also, cattle and compost tea treatments could significantly reduce fruit juice acidity storage in shelf life conditions through the two studied seasons than control and the other treatments.

Table 11. Effect of different sources of bio-organic fertilizers treatments on acidity during the shelf life of "Canino" apricot 2014 and 2015 seasons

Treatments	Acidity (%)							
	1st season			Mean	2nd season			Mean
	Zero time	After 4 days	After 8 days		Zero time	After 4 days	After 8 days	
Control	0.97e	1.41a	1.47a	1.25A	0.83g	1.40ab	1.50a	1.24A
Algae extract	0.67de	1.15c	1.19bc	1.08B	1.07h	1.20b	1.25b	1.17B
Chicken manure extract	0.73d	1.18bc	1.21b	1.10B	1.07h	1.15c	1.22b	1.01B
Cattle manure extract	0.83d	0.88e	0.91de	0.91C	0.80g	1.00de	1.03d	0.94CD
Compost tea extract	0.87d	0.80f	0.84ef	0.86C	0.93f	1.00de	1.04d	0.99C
Nile fertile extract	0.97e	1.36ab	1.38ab	1.22A	1.05d	1.17c	1.21b	1.14AB
Mean	0.84B	1.13A	1.17A		0.83B	1.15AB	1.21A	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Effect of different sources of organic fertilizers on fruit characteristics during storage at 0 ˚C and 90 % RH on Weight loss (%):-

Weight loss (%) was significantly increased with the prolonged storage period and the increasing varied among the different types of bio-organic fertilizer and storage periods. Data in Table (12) clearly indicated that there was significant differences between the different types of bio-organic fertilizers in fruit weight loss (%). On other hand, fruit weight loss increased with prolonged of storage period in both seasons. The highest fruit weight loss noticed with control and Nile fertile extract in the first season, while with control and compost tea extract treatments in the second season. Weight loss of fruit was mainly due to water loss through transpiration process, while some weight loss is due to loss of carbon in respiration process (Mehaisen, 1999). Also, Abdrabboh and Abdel-Razik (2009) indicated that weight loss % was increased gradually with prolonged storage period.

Table 12. Effect of different sources of bio-organic fertilizers on fruit weight loss (%) of Canino apricot fruit during cold storage at 0 °C and 90 RH during 2014 & 2015 seasons.

Treatments	Weight loss (%)				Mean
	At harvest	After 10 days	After 20 days	After 30 days	
			First season		
Control	0.00k	14.07f	18.71d	20.69c	15.49AB
Algae extract	0.00k	6.06j	17.26de	23.27b	13.25C
Chicken manure extract	0.00k	9.71i	15.59e	19.03cd	12.64C
Cattle manure extract	0.00k	11.17h	15.49e	23.85b	14.08BC
Compost tea extract	0.00k	9.93i	15.52e	20.48c	12.57C
Nile fertile extract	0.00k	12.79g	17.72de	25.72a	16.39A
Mean	0.00D	10.62C	16.72B	22.17A	
			Second season		
Control	0.00l	21.03e	25.27de	32.20a	23.02A
Algae extract	0.00l	12.85i	21.46e	28.58c	17.21CD
Chicken manure extract	0.00l	9.97k	16.18h	26.73d	14.33E
Cattle manure extract	0.00l	15.02hi	18.44fg	30.19b	18.70BC
Compost tea extract	0.00l	10.83jk	30.88b	32.36a	19.92B
Nile fertile extract	0.00l	12.20ij	19.23f	28.08c	15.98DE
Mean	0.00D	13.65C	21.91B	29.69A	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Firmness (lb/inch^2):

As shown in Table (13) it is clear that fruit firmness gradually decreased under cold storage in all treatments including control. In this regard, data cleared that trees which were fertilized with different types of bio-organic fertilizer resulted fruits with more firmness than the unfertilized trees and more respond to storage for 4 weeks. Chicken manure was significantly the highest fruit firmness followed by Algae extract in the first season and also in the second season in addition the cattle manure extract treatment.

Table 13. Effect of different sources of bio-organic fertilizers on fruit firmness of Canino apricot fruit during cold storage at 0 °C during 2014 & 2015 seasons

Treatments	Firmness (lb/inch^2)				Mean
	At harvest	After 10 days	After 20 days	After 30 days	
			First season		
Control	10.33h	8.33k	6.40mn	3.33q	7.10F
Algae extract	17.31a	15.67ab	11.00g	4.33p	12.08B
Chicken manure extract	16.05a	15.33bc	12.80e	5.33o	12.38A
Cattle manure extract	15.45bc	15.00c	9.53j	6.13n	11.53C
Compost tea extract	14.00d	13.67d	9.87ij	6.33mn	10.97D
Nile fertile extract	11.67f	10.00hi	7.33l	6.67m	8.92E
Mean	14.13A	13.00B	9.49C	5.36D	
			Second season		
Control	11.60h	9.40j	6.87lm	4.00p	8.05E
Algae extract	18.27a	17.38b	12.22g	5.80o	13.88A
Chicken manure extract	17.80ab	16.13c	13.60e	6.20no	14.02A
Cattle manure extract	17.40b	16.40c	10.60i	6.53mn	13.16B
Compost tea extract	15.29d	15.20d	11.13h	7.33l	13.01C
Nile fertile extract	12.93f	11.27h	8.20k	6.27no	10.06D
Mean	15.55A	14.30B	10.44C	6.02D	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

TSS (%)

It is clear from data in Table (14) that the TSS was different between treatments at harvest and gets to increase significantly when storage period prolonged from initial day to the end of 20 days then decreased in both seasons. The storage give the optimum fruit TSS. The reduction in TSS was relatively more rapid at higher temperature (at shelf life). Similar results were also observed by Patel *et al.* (2008) on onion. Changes in TSS content were natural phenomenon that occurs during storage and it is correlated with hydrolytic changes in carbohydrates during cold storage (Kundan *et al.*, 2011). The reduction in TSS during storage indicates faster metabolic rates at higher temperature as also reported by Mahajan *et al*. (2006). However, Algae and chicken manure treatments significantly recorded the highest % in the 1st season (13.54 and 13.30 %) as well as in 2nd season (15.06 and 14.68 %) respectively.

Table 14. Effect of different sources of bio-organic fertilizers on fruit TSS of Canino apricot fruit during cold storage at 0 °C during 2014 & 2015 seasons.

Treatments	TSS %				Mean
	At harvest	After 10 days	After 20 days	After 30 days	
			First season		
Control	11.50g	12.50ef	13.43bc	12.80c-e	12.56C
Algae extract	13.33b-d	13.90ab	14.43a	12.50ef	13.54A
Chicken manure extract	12.80c-e	13.83ab	14.00ab	12.57ef	13.30AB
Cattle manure extract	12.50ef	12.87c-e	13.83ab	12.73c-e	12.98BC
Compost tea extract	12.40ef	12.70de	13.00c-e	14.17a	13.07B
Nile fertile extract	12.00fg	13.07c-e	13.33b-d	12.90c-e	12.82BC
Mean	12.42C	13.14B	13.67A	12.94B	
			Second season		
Control	12.23l	12.63kl	13.03jk	12.90jk	12.70E
Algae extract	14.70de	15.50b	16.10a	13.93gh	15.06A
Chicken manure extract	14.60d-f	15.30bc	15.50b	13.30ij	14.68B
Cattle manure extract	13.90gh	14.50d-g	15.30bc	14.20e-h	14.48BC
Compost tea extract	13.90gh	14.40d-g	14.87cd	14.00f-h	14.29C
Nile fertile extract	13.63hi	14.10e-h	14.57d-f	13.27ij	13.89D
Mean	13.83C	14.41B	14.89A	13.60C	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Total acidity%:-

Data in Table (15), indicated that total acidity increasing during 20 days of the cold storage, after that the rate decreased till the end of storage (30 days). Hulme (1970) reported that the decrease happened in the first stages of storage period may be attributed to the loss of acids in the vital processes during ripening. The increment in acidity during storage is probably due to catabolism of citrate and malate and the pace of catabolism increases with the temperature (Sammi and Masud 2007). It is also noticeable that Algae, chicken and cattle extracts significantly depressed fruit juice acidity than control and other treatments. Hence, we can notice that Algae, chicken and cattle manure extracts effectively could maintain "Canino" apricot fruits quality (less weight loss and juice acidity) as well as (better TSS and firmness) than control and other treatments.

Table 15. Effect of different sources of bio-organic fertilizers on fruit acidity of Canino apricot fruit during cold storage at 0 °C and 90 RH during 2014 &2015 seasons.

Treatments	Acidity %				
	At harvest	After 10 days	After 20 days	After 30 days	Mean
			First season		
Control	0.97c	1.10ab	1.20a	0.90c	1.04A
Algae extract	0.67e	0.83d	0.84d	0.60ef	0.74C
Chicken manure extract	0.73d	0.88d	0.87d	0.54f	0.76C
Cattle manure extract	0.83c	0.94b	0.94	0.64e	0.84B
Compost tea extract	0.87cd	1.20a	1.10ab	0.90c	1.02A
Nile fertile extract	0.97b	1.00b	1.20a	0.86	1.01A
Mean	0.84B	0.99A	1.03A	0.74D	
			Second season		
Control	0.65c	0.79b	0.90ab	0.60cd	0.74A
Algae extract	0.50d	0.67c	0.65c	0.44e	0.57B
Chicken manure extract	0.53d	0.68c	0.67c	0.33f	0.55B
Cattle manure extract	0.53d	0.67c	0.65c	0.37ef	0.56B
Compost tea extract	0.67c	1.01a	0.93ab	0.69c	0.83A
Nile fertile extract	0.70b	0.74bc	0.93ab	0.58cd	0.74A
Mean	0.60B	0.76A	0.79A	0.50C	

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Soil determinations:-

In this study information will be provided for better source of organic matter to increase the organic fertilizer input and improve the soil properties, plant nutrient, soil biological activity and apricot production**.**

Soil biological activities:-

Data in Table (16) show the effect of different treatments on the soil biological activity in rhizosphere soil of apricot trees in terms of total viable bacteria counts (TCB), CO_2 evolution as well as dehydrogenase (DHA) as affected with treatments added separated with four times. All treatments gave parameters higher than treatments amended with recommended dose (control). Total counts of bacteria showed a negative response to treatments particularly control (67.39 and 73.3 cfu $x10^6$) at two seasons, respectively. So, increasing the nitrogen levels (control) decreased total bacteria counts, the highest bacteria counts was with Algae extract and Compost tea extract giving 112.45-130.36 and 105.20-122.30 cfu $X10^6$ in two seasons respectively, were recorded in Table (16).

Also, same trend noticed in prevailing microorganisms was achieved for CO_2 and DHA activity. The corresponding highest values were (121.00 and 152.33 mg/100g soil $^{-1}$ (CO_2) and 98.80 and 101.22 ugTpf mg $100g^{-1}$ d. wt soil day^{-1} at two seasons, respectively. These results are on the line with **Mandal *et al.*, (1999**) reported a significant increase in organic carbon content in the soil due to successive, which in turn increased soil fertility through enhancing the growth and biomass of the soil microorganisms. The application of different organic fertilizers (compost) increased the soil microbial biomass, which in turn increased total microbial, CO_2 and DHA. Generally, all tested soil biological activity parameters under the effect of the tested treatments were higher than these of the control treatment.

Table 16. Effect of different sources of bio-organic fertilizers on soil biological activities during 2014 and 2015 seasons.

Treatments	TCB (cfu $x10^6$)		Dehydrogenase activity (mgTpf$100g^{-1}$ soil)		CO_2 evolution (mg CO_2 $100g^{-1}$ soil)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	67.39 F	73.30 E	76.80E	45.20D	79.62E	83.36 F
Algae extract	112.45 A	130.36 A	98.80 A	101.22A	121.00A	152.3 A
Chicken manure extract	95.96D	106.11D	86.15 D	96.73B	102.30D	113.4 E
Cattle manure extract	98.72C	120.35C	90.73 C	97.32B	105.3C	120.7D
Compost tea extract	105.20B	122.30B	96.35 B	100.00 A	110.5B	125.4 C
Nile fertile extract	93.95E	106.39D	95.22 B	93.32 C	111.3B	130.8B

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'
TCB = Total count bacteria CFU = colony from unit.

Soil properties:-

Table (17) shows the effect of tested treatments on soil WHC, O.M% , pH, EC and total nitrogen (TN) after Canino fruits harvesting.

Results indicated that the soil application of different types of Algae, compost tea and Nile fertile extract led to increase the soil WHC, organic matter (OM) % and total nitrogen (TN) in soil and decreased E.C and pH compared to control. However,soil application with algae extract recorded 30.20 and 33.11 % WHC at the end of experiment at 1st and 2nd seasons, respectively. However, soil application of chicken and cattle extracts were superior in O.M % in soil (0.60 and 0.63, 0.59 and 0.60%) after harvesting in 1st and 2nd seasons, respectively rather than control (0.36 and 0.33 %). The trend for total nitrogen (TN) was observed, since added algae extract had successfully ensured more soil available N % rather than control treatment for two seasons.

Effect of different source of bio-organic fertilizers in soil chemical analysis during 2014 & 2015 seasons

Table (18) shows the effect of the tested treatments on soil Ca and Mg available after harvesting .Results cleared that the soil application of different treatments at both seasons led to increase the soil minerals availability after "Canino" fruits harvesting compared to the initial soil before cultivation. On other hand, Algae gave the highest soil SO_4 compared with the other tested treatments. However, the priority was also for Nile fertile which reduced the Cl^-, Na and $CaCo_3$%, respectively while increase K.

Table 17. Soil physical properties as affected with different sources of bio-organic fertilizers during 2014 & 2015 seasons.

Treatments	WHC (%)		OM (%)		pH		EC (dS/m)		TN (%)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	21.70c	22.25d	0.36d	0.33c	8.18a	8.20a	1.90a	1.96a	10.12c	12.12e
Algae extract	30.20a	33.11 a	0.55ab	0.62ab	8.20a	8.18a	1.82ab	1.90a	19.71a	22.35a
Chicken manure extract	27.11b	28.15 b	0.60a	0.63a	7.76b	7.96ab	1.60d	1.75b	16.50b	19.36d
Cattle manure extract	26.89b	25.36 c	0.59a	0.60ab	7.83ab	7.73b	1.63d	1.65c	16.62b	20.22c
Compost tea extract	27.30b	29.18 b	0.46c	0.59ab	8.05ab	7.79ab	1.70cd	1.66c	17.00b	21.18b
Nile fertile extract	26.36b	28.36 b	0.50bc	0.57b	8.10ab	8.10a	1.75bc	1.70bc	17.10b	22.25a

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'
WHC = Water holding capacity. TN = total nitrogen OM = organic matter.

Table 18. Soil chemical analysis as affected with different sources of bio organic fertilizers during 2014 & 2015 seasons.

Treatments	Cation								Anion					
	Ca^{++}		Mg^{++}		Na^{+}		K^{+}		SO_4^{--}		Cl^{-}		$CaCO_3$%	
	1st season	2nd season	1st Season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	9.03d	8.19e	3.27d	3.39d	6.33a	7.18a	1.40c	1.50b	11.89b	10.15c	10.76a	10.00a	11.60a	11.80a
Algae extract	13.20a	14.05a	6.99a	7.18a	5.11bc	5.01b	1.22cd	1.31c	13.88a	15.10a	8.12b	6.17c	8.64c	8.73c
Chicken manure extract	11.88b	12.00b	5.81b	6.13b	5.25b	4.90b	1.18d	1.30c	13.65a	13.00b	8.00b	6.00c	9.91b	9.48b
Cattle manure extract	8.75d	9.13d	4.84c	4.90c	4.81c	4.50c	1.88b	1.86a	8.12d	9.05d	6.19d	6.33bc	7.18d	7.50d
Compost tea extract	9.22d	9.65d	5.13c	5.22c	4.35d	4.13d	1.82ab	1.90a	8.22cd	9.35cd	7.18c	6.20c	6.35e	6.71e
Nile fertile extract	10.01c	10.50c	4.99c	5.100c	4.00e	3.26e	1.90a	1.86a	9.00c	9.60cd	6.76cd	6.80b	6.52de	6.50e

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Effect of different source of bio-organic fertilizers on N, P, K (%), Fe, Zn, and Mn (ppm) in plant leaf during 2014 & 2015 seasons:-

According to the data in Table (19), the obtained results showed that quality of "Canino" leaves increased after adding organic fertilizer specially the algae extract treatment during the two seasons. Data in Table (19) revealed that N, P, K% in leaves have significant increase in all treatments compared with control. Moreover, Fe, Mn, Zn ppm were significantly increased in treatment algae extract in the two seasons compared with control. Algae extract treatments gave (235, 239, 46.90 and 47.30, 42.89 and 41.39 ppm) in both seasons under study for Fe, Mn and Zn, respectively.

Table 19. Leaf N, P, K, Fe, Zn and Mn as affected by different sources of bio-organic fertilizers during 2014 &2015 seasons

Treatments	N %		P %		K %		Fe ppm		Zn ppm		Mn ppm	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	2.15d	2.10e	0.20d	0.21c	2.07c	2.11c	245.6a	210.6d	40.09d	41.11c	27.50e	28.19d
Algae extract	2.90a	2.97a	0.28a	0.28a	2.97a	2.92a	235.0b	239.6a	46.90a	47.30a	42.89a	41.39a
Chicken manure extract	2.85ab	2.87ab	0.26b	0.26b	2.38b	2.28b	221.0c	223.1bc	45.36b	46.35a	40.08b	40.81a
Cattle manure extract	2.62bc	2.69bc	0.25b	0.27ab	2.26b	2.25b	220.0c	223.0c	43.40c	44.24b	39.10b	39.63a
Compost tea extract	2.50c	2.56cd	0.26b	0.26b	2.26b	2.27b	230.0b	228.2b	40.68d	43.35b	33.65c	34.81b
Nile fertile extract	2.36cd	2.35d	0.23c	0.21c	2.26b	2.30b	219.0c	221.0c	40.30c	41.42c	31.78d	32.01c

Means separated within column using LSD test at P≤0.05; Means followed by the same letter were not significantly different'

Overall, From the obtained results it could be concluded that requirements for "Canino" apricot trees by bio-organic fertilizers are sufficient to improve nutritional status of Canino" trees and gave a suitable yield with high fruit quality especially (algae, chicken, cattle and compost tea) extracts. In addition the microorganisms working on the organic matter in the soil to convert organic form of nutrients such as N to mineral N. This increase in the uptake of nutrients from soil by roots of plant promotes plant growth (Lampkin, 1990). Also, biofertilizers play a fundamental role in converting P or K fixed form to be soluble ready for plant nutrition making the uptake of nutrients by plant more easy (Zayed 1996).

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مدى استجابة أشجار المشمش (كانينو) إلى التسميد ببعض الأسمدة العضوية والحيوية

نيفين مصطفى طه[1] ورضا محمد الشحات[2]

١) معهد بحوث البساتين - مركز البحوث الزراعية – الجيزة - مصر

٢) معهد بحوث الأراضى والمياه والبيئة - مركز البحوث الزراعية – الجيزة - مصر

أجريت هذه الدراسة خلال ثلاث سنوات متتالية (٢٠١٣، ٢٠١٤ و ٢٠١٥) وكان العام الأول موسم بدء التجربة فيه تم إضافة الأسمدة وأخذ قرءات أولية على أشجار المشمش (كانينو) وكان عمر الأشجار حوالى ١٠ سنوات وكانت هذه الأشجار نامية فى أراضى رملية مستصلحة حديثا في منطقة الخطاطبة – محافظة المنوفية. وتهدف هذه الدراسة إلى استخدام مصادر تسميد مختلفة عضوية وحيوية (الطحالب –سماد الدواجن –سماد الماشية –الكمبوست تى –Nile fertile) على هيئة مستخلص كإضافة أرضية بالإضافة إلى معاملة المقارنة (الكنترول) تسميد معدنى تبعاً لتوصيات وزارة الزراعة، ومعرفة أثر التسميد بهذه المصادر المختلفة على بعض الصفات الخضرية والطبيعية والكيماوية وكذلك تركيز العناصر المعدنية فى الثمار والأوراق بالإضافة إلى أثر هذه الأسمدة على نشاط إنزيم الديهيدروجينيز وكمية ثانى أكسيد الكربون المنبعثة من التربة وأثر النشاط البيولوجي، وكانت النتائج كالتالى:-سجلت معاملة الطحالب أعلى زيادة فى طول وعرض الأفرع النامية، كذلك عدد الأوراق والكلوروفيل يليه معاملة مستخلص الدواجن.مستخلص الطحالب، الدواجن والماشية سجلوا أعلى زيادة فى نسبة العقد والمحصول والمواد الصلبة الذائبة مع نقص نسبة الحموضة.جميع المعاملات رفعت من قدرة الثمار على التخزين فى جو الغرفة لمدة ثماني أيام، أيضاً التخزين البارد على درجة الصفر المئوى لمدة ٣٠ يوم، المعاملة بمستخلص الدواجن والطحالب سجلوا أقل فقد فى الوزن كذلك صلابة الثمار.المواد الصلبة الذائبة سجلت زيادة تدريجياً خلال التخزين فى جو الغرفة أو تحت التخزين البارد وسجلت معاملة مستخلص الطحالب، الدواجن والماشية أعلى نسبة بالمقارنة بباقى المعاملات ومعاملة الكنترول (المقارنة).النشاط البيولوجى فى التربة (أعداد البكتريا، أنزيم الديهيدروجينيز وكمية ثانى أكسيد الكربون) المنبعث سجلوا زيادة إيجابية من خلال التسميد الحيوى والعضوي، معاملة التربة بمستخلص الطحالب، كمبوست تى، Nile fertile أدى إلى زيادة فى السعة الحقلية، المادة العضوية، pH والنتروجين الكلى مع نقص فى EC بالمقارنة بالتسميد المعدنى (الكنترول).