EFFECT OF BIO FERTILIZERS AND NATURAL MINERALS ON PRODUCTIVITY AND FRUIT QUALITY OF "PICUAL" OLIVE TREES

ABSTRACT

The present study was carried out during **2009** and **2010** growing seasons on 'Picual' olive cv., (12 years old), planted in Fifa Company for Food Technology. The olive farm located at 50 kilometer from Cairo (Cairo Alexandria Road). The trees are planted at 6 × 6 meters apart and grown in sandy soil and irrigated with drip irrigation from well (underground water). The effect of Pomace of the olive mill wastes, Compost, Rock phosphate, Feldspar solely or combined with Netropeine, Phosphoreine and Potaseine (biofertilizers) on vegetative growth, flowering, yield and fruit characteristics of "Picual" olive trees was studied. Data revealed that Compost solely increased shoot length and shoot diameter in the second season whereas, No. of leaves was significantly increased as affected by Compost addition in both seasons compared to the other tested treatments. The addition of Compost supported with biofertilizers significantly improved No. of inflorescences/m in the first season, only. Perfect flowers percentage and and No. of retained fruits/m after June drop were improved as influenced by the control or Pomace provided with biofertilizers and Rock phosphate solely during both growing seasons. Feldspar treatment solely gave the superior values in yield and plup/seed ratio during the first season. Pomace enriched with biofertilizers and Compost solely improved fruit length, fruit diameter during both seasons, respectively. Fruit and plup weight were enhanced due to Pomace or Compost combined with biofrtilizer treatments. As for the yield, the Feldspar solely or Pomace and Compost plus biofertilizers gave the highest significant values compared to the control and other treatments.

It is recommended to add Feldspar and Pomace and compost in addition to the bio and natural fertilizers to improve "Picual" olive cv. production and fruit quality.

Key words: Picual, Olive, Compost, Pomace, Biofertilizers, Natural elements, Feldspar, Rock phosphate`.

1-INTRODUCTION

Increasing olive trees productivity under desert conditions must be based on appropriate technical and economical management due to the natural resources scarcity. Furthermore, production and utilization of chemical fertilizers are considered as, air, soil and water polluting agents, in addition to the high costs of their manufacture. Olive trees areas increased rapidly in Egypt and reached about 163273 Fadden, with total production about 611600 tons, where 20% of the total fruit production produces about 10000 tons of olive oil (according to the latest statistics of Ministry of Agriculture, 2010-2011). The efficiency of fertilizers used in Egypt is very low, may be due to high pH or calcium carbonate level in the soil which hamper the availability of P-fertilizers, in addition to the leaching of nitrate or ammonia volatilization from the nitrogen fertilizers **(Soliman, 2001**). Thus, the application of organic fertilizer avoided these pollutions, reduced the costs of fertilization and would be safe for human, animal and environment. As a result of chemical fertilizers misuse, the natural of the agriculture land is changed and exhausted. Therefore, the alternative use of natural elements compounds can improve the soil physical, chemical properties, as well as, increased water uptake and nutrient availability (**Helail *et al.,* 2003** and **Eman *et al.,* 2010).** Although, Composts weakly affected soil properties, they increased soil potentially available nutritive elements to crops (**Canali *et al.,*2004)**. Two phase olive Pomace in agriculture as an organic fertilizer and soil conditioner It has a moderate acidity, a high content of organic matter (OM) and potassium that are rich in partially humified organic matter and have a

substantial content of potassium and nitrogen and a low content of phosphorus and micronutrients **(Cegarra *et al.,* 2004).**

Aguilar *et al*., (1996) concluded that the refuse compost increased tree nutritional status and olive yields. Compost increased OM concentration and cationic exchange capacity **(Cayuela *et al,* 2004).** Biofertilizers contain microorganisms that help in availability of minerals as well as modification of nutrient uptake by the plant**.** Moreover, **Haggag *et al,* (1994)** studied the effect of biofertilizers "Phosphorine" on phosphorous content and dry matter of guava seedlings growing in sandy soil conditioned with composted town refuse. They found that with increased application rate of the composting of olive oil processing waste water and solid residue (Pomace) to the soil, the water-holding capacity of this conditioner was almost two times greater than that of the pure soil. There was a decrease in the pH, an increase in the specific conductivity, and an increase in the ammonium-nitrogen (NH_4-N) and P concentration of the mixture (**Bouranis *et al*., 1995)**. Natural elements compounds as Feldspar, sulphur and magnetite are used as a source of some nutrient minerals. This management is considered clean or organic agriculture and these compounds improve soil aggregation, structure, permeability, infiltration, EC and may overcome the harmful effect of saline water application. Moreover, Egyptian soils having alkaline pH are low in their available nutrients. Sulphur is frequently considered the most important amendment for soil reclamation and improvement through, reducing soil pH, improving water relations and increasing availability some nutrient elements needed for growth and yield **Harhash and Abdel-Nasser, (2000) and El-Dsouky *et al .,* (2002)**. In order to reduce the dependence on imported potash, Feldspar a potash mineral, contains 11.25 % K2O and therefore it could be a potential K-source for crop production **(Badr, 2006).** The use of potassium Feldspar or crushed granite dose gives a yield response, although no greater than for conventional fertilizers **(Manning, 2010).**

There upon, this study was conducted to evaluate the effect of biofertilizers and natural minerals on productivity and fruit quality of Picual olive trees.

2- MATERIAL AND METHODS

The present study was carried out during 2009 and 2010 growing seasons on 'Picual' olive trees (12 years old) trees uniform in shape and size as possible and planted 6 x 6 meters apart in Fifa Company for Food Technology Olive Farm at 52 kilometer from Cairo (Cairo Alexandria Road). Soil analysis is conducted according to **Jackson (1973)** and the results is listed in Table (1) cultural practices in the farm.

Table 1, The experimental soil macro and micro elements analysis.

Available Macronutrients (%)			Available Micronutrients (ppm)			
N	P	K	Zn	Cu	Mn	Fe
0.072	0.49	0.358	7.62	0.85	3.15	189

The experimental trees are grown in sandy loam soil and irrigated with drip irrigation from well (underground water) salt concentrations 800 ppm and received normal fertilization.

Annual fertilizers per feddan, 20 m^3 organic manur, 150kg superphosphate (15.5%P_2O_5), 500 Kg ammonium sulphate (20.6% N) and 200Kg potassium sulphate (48% K_2O). In addition to these amounts as the usual amounts added from organic and chemical fertilizers the Pomace (25 Kg/tree), Compost (20 Kg/tree), Rock phosphate (1.5 Kg/tree), Feldspar (3kg/tree), Nitrpeine (120 g/tree), Phosphoreine (25 Kg/tree) and Potasseine (134 g/tree). These doses consistent with the recommendations of the Department of the Soil and Water Research Institute, Agricultural Research Center, Giza, Egypt.

2-1-Treatments and Experiment layout

1- Control.
2- Pomace.
3- Compost.
4- Rock phosphate.
5- Feldspar.
6- Pomace + "biofertilizers" as (Netropeine + Phosphoreine + Potasseine).
7- Compost + biofertilizers.
8- Rock phosphate + biofertilizers.
9- Feldspar + biofertilizers.
10- Pomace + Compost + biofertilizers.
11- Pomace + Compost + Rock phosphate + biofertilizers.

2-2- Measurements

2-2-1- Soil analysis: Soil samples were taken from the major root zone at the end of each growing season and analyzed electrical conductivity (EC), soluble ions and soil pH. Soil chemical, physical properties and nutrient availability were determined according to **Chapman and Pratt (1978).**

In December of both seasons, twenty healthy one year old shoots were randomly chosen and labeled at each direction for carrying out the following measurements.

2-2-3- Growth parameters.

In the first week of August of both seasons, the following characteristics were measured: Shoot length (cm), shoot diameter (cm), number of leaves per shoot.

2-2-4 - Flowering parameters.

Flowering density: At full bloom of both seasons, the following blooming measurements were determined i.e., number of inflorescence per meter and inflorescence length (cm) on the labeled twenty shoots was calculated, number of total flowers per inflorescence, perfect flowers %: the percentage of perfect flowers to total flowers/ inflorescences later was calculated.

2-2-5- Fruiting parameters.

1- Fruit set percentage was determined at 15 days later from full bloom as initial set fruit and number of remained fruits was determined 60 days later from full bloom.
2- Yield: average yield (Kg)/tree were calculated.

2-2-6- Fruit quality:

Thirty fruit per each tree were randomly selected for carrying out the fruit quality measurements namely fruit weight (g), fruit length (cm), fruit diameter (cm), pulp weight (g.), seed weight (g.), pulp/seed ratio, seed length (cm) and seed diameter (cm).

2-3-Statistical analysis.

The experiment included in this study followed a complete randomized design in factorial experiment. The obtained data was subjected to analysis of variance (ANOVA) according to **Snedecor and Cochran (1980).** Differences between treatments were compared by **Duncan's(1995)** multiple range tests described in the **SAS (1986)**.

3-RESULTS AND DISCUSSION

3-1- Vegetative growth.

Table (2), shows the effect of bio and natural fertilizers on shoot growth during 2009 and 2010 growing seasons. Data revealed that Compost solely or Feldspar gave the highest significant values of shoot length compared with the control and other treatments in the second season only. On the other hand, Rock phosphate provided with biofertilizers treatment performed the least significant value, in this respect. The other treatments revealed mediated values. However, the same treatments didn't perform any significant difference in the first season.

As for shoot diameter, the treatments of Rock phosphate or Compost solely, Feldspar supported with biofertilizers and Compost enriched with Pomace, Rock phosphate and

biofertilizers besides the control gave the highest significant values compared to the other treatments during 2010 season, whereas during 2009 season there weren't any significant differences.

Concerning number of leaves/shoot, Compost treatment only surpassed all treatments in including the control in both seasons. In contrast, Rock phosphate provided with biofertilizers and Feldspar supported with biofertilizers treatments recorded the least values during 2009 and 2010, respectively.

In regard to the number of inflorescences/m, Compost combined with biofertilizers besides Rock phosphate supported with biofertilizers gave the highest significant values, in this respect compared with other treatments including the control. On the contrary, Feldspar treatment performed the least significant value during the first season. Meanwhile, there weren't any significant differences during 2010 season. These data were consistent with the results obtained by **Harhash and Abdel-Nasser, (2000); El-Dsouky *et al*., (2002) and Cayuela *et al*, (2004).** They concluded that Compost or Pomace solely or combined with either biofertilizers or natural ones improved vegetative growth.

Table 2, Effect of bio and natural fertilizers on some vegetative growth parameters and No. of inflorescences of Picual olive trees during 2009 & 2010 rowing seasons.

Treatments	Shoot length (cm.)		Shoot Diameter (cm.)		Number of leaves/Shoot		No. of inflorescences/m	
	2009	2010	2009	2010	2009	2010	2009	2010
Control	11.67	14.73ac	0.22	0.187a	16.30b-d	23.27ab	22.33bc	63.4
Pom.	12.2	16.16ac	0.233	0.167ab	17.53bd	20.70ab	22.90bc	65.8
Com.	11.43	20.60a	0.177	0.193a	24.93a	25.50a	22.17bc	39.03
Roc.	12.5	13.900bc	0.187	0.180a	21.13ab	23.63b	23.80bc	63.03
Fel.	10.53	16.833ab	0.187	0.160ab	21.13b	24.67b	17.57c	57.57
Pom + A	11.53	15.17ac	0.21	0.157ab	16.73bd	19.07ab	24.63bc	58.07
Com. + A	11	14.4bc	0.187	0.163ab	21.13ab	21.33b	37.80a	54.93
Roc. + A	9.6	10.167c	0.203	0.157ab	14.23d	19.27b	27.67b	50.83
Fel. + A	10.7	12.067bc	0.203	0.173a	20.63ac	16.80b	26.57bc	56.67
Pom. + Com.+A	13.33	10.67bc	0.223	0.137b	15.90cd	19.20ab	25.03bc	66.47
Pom.+ Com.+Roc.+A	12.87	11.767bc	0.183	0.173a	15.27d	20.30b	25.33bc	58
LSD	NS	5.3918	NS	0.0319	4.5808	6.8139	7.9482	NS

Means followed by the same letter(s) within the same column are not significantly different, at p = 0.05 Pom. (Pomace) * Com. (Compost). * Roc. (Rock phosphate) * Fel. (Feldspar). * A biofertilizers.

3-2-Flowering and set fruit.

Table (3) demonstrates that inflorescence length was significantly increased by the addition of Rock phosphate and the Compost provided with Pomace, Rock phosphate and biofertilizers treatments during 2009 and 2010 growing seasons, respectively. On the other hand, the control and the Pomace treatments showed the least significant values in this sphere, respectively.

Regarding number of flowers/inflorescence, reported data shows that all tested treatments induced a higher significant value as compared with control during the first growing season. Whereas, the Compost combined with Pomace, Rock phosphate besides biofertilizers treatment detected the highest significant values as compared with control and other treatments during the second season. The reverse was true for

the control and Pomace treatments hence they gave the least significant values compared to other treatments during the first and second seasons, respectively.

Perfect flowers percentage in response the control and the Pomace combined with biofertilizers treatments produced the highest significant values compared to other treatments during the first season. On the contrary, Rock phosphate and biofertilizers showed the least significant values in this respect. There weren't any significant difference between treatments.

As for number of fruits set/m during 2009 season, data show that Rock phosphate treatment surpassed the control and other treatments in inducing high positive effect. Reversely, olive Pomace treatment gave the least significant difference. These results go in line with those of **El-Sayed, (2009)** on olive. Enhancement of flowering characteristics may be due to the role of Compost, Pomace, natural minerals and biofertilizers, which increased water through regulating the stomata or through compensating, excessive water loss through transpiration is prevented and thus K improves the water use efficiency.

Table 3, Effect of bio and natural fertilizers on flowering and set fruit of Picual olive trees during 2009 & 2010 growing seasons.

Treatments	Inflorescence length		No. of flowers /inflorescence		Perfect flowers (%)		Fruit set (%)	
	2009	2010	2009	2010	2009	2010	2009	2010
Control	2.17c	1.60bc	7.37b	13.73ab	38.37a	15.07	38.33bc	63.4
Pom.	2.23bc	1.57c	11.07ab	1347b	36.53ab	11.97	26.87c	65.8
Com.	2.50bc	1.77ab	12.60a	14.80ab	33.17 ac	14.83	35.90bc	39.03
Roc.	3.20a	1.60bc	12.43a	14.27ab	22.30bc	13.87	53.70a	63.03
Fel.	2.57bc	1.73ac	10.77ab	13.87ab	24.47ac	10.53	33.40bc	57.57
Pom + A	2.27bc	1.77ab	12.00a	14.80ab	37.70a	14.03	34.20bc	58.07
Com. + A	2.57b	1.73ac	12.47a	14.13ab	28.43 ac	13.7	33.90bc	54.93
Roc. + A	2.60bc	1.70ac	12.70a	15.67ab	20.97c	11.9	41.60ab	50.83
Fel. + A	2.23bc	1.77ab	11.87a	15.07ab	22.47ac	15.6	42.30ab	56.67
Pom. + Com.+A	2.43bc	1.70ac	12.13a	14.13ab	29.50ac	14.1	46.00ab	66.47
Pom.+Com.+Roc.+A	2.30bc	1.80a	10.43ab	16.40a	32.80ac	12.53	40.20bc	58
LSD	0.3832	0.169	3.597	2.33	12.8	NS	12.21	NS

*Means followed by the same letter(s) within the same column are not significantly different, at p = 0.05.

* Pom. (Pomace) * Com. (Compost). * Roc. (Rock phosphate) * Fel. (Feldspar).

* A biofertilizers.

3-3- Fruiting and fruit quality parameters.

Table (4) concerning number of remained fruits/m (60 days after full bloom) data revealed that Rock phosphate treatment significantly increased this parameter in comparison with the control during the second season, whereas in the first one there weren't any significant values. On the contrast Pomace supported with biofertilizers treatment showed the least significant value.

As for yield, the Feldspar treatment showed the superiority in enhancing tree yield followed descendingly by the Feldspar provided with biofertilizers and the Pomace supported with biofertilizers during the first season. However, the control performed the least significant value. Meanwhile, there weren't any significant differences between treatments in the second season.

It is suffice to say that as a conclusion, although, Feldspar treatment solely gave the superior values in yield during the first season, Pomace provided with biofertilizers and Compost combined with biofertilizers treatments improved olive fruit quality in both seasons.

Effect of bio and natural fertilizers on the fruit characteristics ispresented in **Table, (4)**. It is obvious that Pomace provided with biofertilizers and Compost supported with biofertilizers significantly increased fruit weight during 2009 and 2010 growing seasons, respectively compared with other treatments includes the control.

Illustrated that Pomace provided with biofertilizers and Compost enriched with biofertilizers treatments gave the highest values of fruit length compared to the control and other

treatments. On the other hand, Compost supported with biofertilizers treatment performed the least significant values during the first growing season.

Table 4, Effect of bio and natural fertilizers on fruit characteristics of Picual olive trees during 2009 & 2010 growing seasons.

Treatments	No. of remained fruits/m		Yield (kg)/tree		Fruit weight (g)		Fruit length	
	2009	2010	2009	2010	2009	2010	2009	2010
Control	16.67	13.43b	21.80b	46.67	7.40ce	8.60ab	2.90ac	2.83
Pom.	11.77	14.77ab	36.67ab	56.67	7.77bd	8.97a	2.9ac	2.97
Com.	12.9	15.90ab	28.33ab	48.33	8.20ab	8.93a	3.03a	2.93
Roc.	17.73	21.73a	30.00ab	50	8.07ac	7.70c	2.97ab	2.83
Fel.	14.87	17.87ab	43.33a	50	8.03ac	8.13bc	2.90ac	2.87
Pom + A	10.53	13.20b	28.33ab	48.33	8.53a	7.63c	5.03a	2.73
Com. + A	15.4	17.40ab	25.00b	45	6.93e	9.13a	2.70d	2.9
Roc. + A	14.07	16.73ab	24.00b	44	7.37ce	8.10bc	2.80cd	2.8
Fel. + A	16.8	19.80ab	38.37ab	51.67	7.47ce	8.57ab	2.87bc	2.9
Pom. + Com. + A	14.43	17.43ab	28.00ab	50	7.10de	8.60ab	2.77cd	2.9
Pom.+ Com. + Roc. + A	14.1	16.43ab	31.67ab	45	7.77bd	8.73ab	2.87bc	2.83
LSD	N.S	6.2799	14.384	NS	0.6512	0.6301	0.1251	NS

*Means followed by the same letter(s) within the same column are not significantly different, at p = 0.05.

* Pom. (Pomace) * Com. (Compost). * Roc. (Rock phosphate) * Fel. (Feldspar).* A biofertilizers.

3-4- Fruit characteristics and yield.

Effect of bio and natural fertilizers on the fruit characteristics ispresented in **Table, (5)**. As for fruit diameter Pomace provided with biofertilizers, Rockphosphate supported with biofertilizers and Feldspar, treatments significantly increased fruit diameter of Picual olive tree compared to the control during the first growing season. On the contrast, Pomace provided with biofertilizers treatment performed the least significant values. In the second season Pomace treatment surpassed the other treatments including the control in enhancing olive fruit diameter.

Concerning pulp weight Compost solely, Pomace provided with biofertilizers and Compost supported with biofertilizers increased significantly the pulp weight during 2009 and 2010 seasons, respectively compared to the control and other treatments, followed by Pomace solely and Pomace supported with Compost, Rock phosphate and biofertilizers. Whereas, Feldspar and Pomace provided with biofertilizers surpassed other treatments and the control during 2009, followed by Pomace supported with Compost, Rock phosphate and biofertilizers in 2010 season.

In regard to seed weight Pomace enriched with biofertilizers, Compost and Compost combined with Pomace, Rock phosphate and biofertilizers treatments gave the highest values. Meantime, the control and Pomace combined with biofertilizers treatments performed the same analogous effect during the second season.

Table 5, Effect of bio and natural fertilizers on seed characteristics of Picual olive cv. during 2009 & 2010 growing seasons.

	Fruit diameter		Pulp weight (g.)		Seed weight (g)	
	2009	**2010**	**2009**	**2010**	**2009**	**2010**
Control	2.20bc	2.40ab	6.50e	7.30d	0.90ab	1.30a
Pom.	2.30a	2.43a	6.90d	7.74b	0.87ab	1.23ab
Com.	2.30a	2.40ab	7.27b	7.86a	0.93a	1.07ab
Roc.	2.27ab	2.37ab	7.17c	6.53g	0.90b	1.17ab
Fel.	2.30a	2.33b	7.16c	7.10e	0.87ab	1.03b
Pom + A	2.30a	2.33b	7.60a	6.33h	0.93a	1.30a
Com. + A	2.17c	240ab	6.03g	7.86a	0.90ab	1.27ab
Roc. + A	2.30a	2.33b	6.50e	6.97f	0.87ab	1.13ab
Fel. + A	2.23ac	2.37ab	6.57e	7.40cd	0.90ab	1.17ab
Pom. + Com.+A	2.23ac	2.40ab	6.30f	7.47c	0.80b	1.13ab
Pom.+Com.+Roc.+A	2.30a	2.40ab	6.84d	7.70b	0.93a	1.03b
LSD	0.078	0.078	0.091	0.105	0.0884	0.2225

*Means followed by the same letter(s) within the same column are not significantly different, at p = 0.05.

* Pom. (Pomace) * Com. (Compost). * Roc. (Rock phosphate) * Fel. (Feldspar). * A biofertilizers.

As for pulp/seed ratio Feldspar treatment solely and Pomace in addition to biofertilizers gave the highest significant values compared to the control and other treatments during 2009 growing season. Meantime Pomace supported with compost, Rock phosphate, biofertilizers performed the same analogous effect during 2010 growing season. On the contrary, the control performed the least significant difference of pulp/seed ratio in both seasons.

Seed length showed the highest significant values as affected by the Pomace provided with Compost, Rock phosphate and biofertilizers treatments in comparison with other treatments including the control during the first growing season. Meanwhile, Pomace and Compost combined with biofertilizers treatments significantly increased seed length compared to the control during the second growing season.

As for seed diameter, Pomace treatment induced the highest significant values compared to the control and other treatments. These results are in harmony with those reported by (**El- Salhy *et al*., 2006)** on grapevines and **(Eman *et al*., 2010)** on pear trees. Using natural elemental compounds as sulphur, Feldspar and magnetite caused remarkable promotion on set fruit and yield which may be due to the improvement of soil characteristics and nutrient status and its important role in translocation of compounds which increase the growth pooled in yield and fruit quality.

Table 6, Effect of bio and natural fertilizers on fruiting and yield of Picual olive trees during 2009 & 2010 growing seasons.

Treatments	Pulp/seed ratio		Seed length		Seed diameter	
	2009	2010	2009	2010	2009	2010
Control	7.22g	5.61g	1.73ac	1.83ab	0.90b	1.17a
Pom.	7.93b	6.29e	1.67cd	1.90a	1.00a	1.10ab
Com.	7.81d	7.34b	1.77ab	1.73b	0.90b	1.03bc
Roc.	7.96b	5.58g	1.80ab	1.83ab	0.93b	1.13ab
Fel.	8.22a	6.89c	1.80ab	1.80ab	0.90b	1.03bc
Pom + A	8.17a	4.87h	1.80ab	1.80ab	0.90b	1.13ab
Com. + A	6.70h	6.19f	1.70bd	1.90a	0.90b	1.10ab
Roc. + A	7.47e	6.17f	1.63d	1.83ab	0.90b	1.07ac
Fel. + A	7.30f	6.32e	1.80ab	1.73b	0.90b	0.97c
Pom. + Com.+A	7.87c	6.61d	1.67cd	1.83ab	0.83c	1.07ac
Pom.+Com.+Roc.+A	7.35f	7.47a	1.83a	1.80ab	0.90b	0.97c
LSD	0.053	0.074	0.0884	0.1021	0.0417	0.1251

*Means followed by the same letter(s) within the same column are not significantly different, at p = 0.05.

* Pom. (Pomace) * Com. (Compost). * Roc. (Rock phosphate) * Fel. (Feldspar).* A biofertilizers.

These results go in line with those reported by **Smith *et al*., (1994); Smith (1998); Canali *et al*., (2004); Cegarra *et al*., (2004), Aguilar *et al*., (1996) and Cayuela *et al*., (2004).** They performed that, although, Composts weakly affected soil properties, they increased soil potentially of available nutritive elements to two phase olive Pomace in agriculture as an organic fertilizer and soil conditioner. Olive Pomace has a moderate acidity, a high content of organic matter (OM) and potassium that are rich in partially humified organic matter and have a substantial content of potassium and nitrogen and a low content of phosphorus and micronutrients, which subsequently lead to improve tree nutritional status and finally olive yield. Compost increased OM concentration and cationic exchange capacity. **EL-Sayed, (2009)** demonstrated that the addition of Compost or Pomace combined with natural minerals Feldspare or Rock phosphate besides the combination with biofertilizers improved the vegetative growth, flowering, fruit characteristics, set fruit and yield of Manzanillo olive cv.

4-REFERENCES

Aguilar, T. J.; F.P. Gonzalez and M. C. M Pastor. Improvement of soil fertility in olive orchards by periodically applying composted solid urban waste, comparison with the system of non-tillage with bare soil. Olivae. 1996, No. 64, 40-45; 23 ref.

Badr, M. A. Efficiency of K- Feldspar combined with organic materials and silicate dissolving bacteria on Tomato yield. 2006J. of Applied Sci. Res., 2(12): 1191- 1198.

Bouranis, D.L.; A.G. Vlyssides; J.B Drossopoulos and G. Karvouni. Some characteristics of a new organic soil conditioner from the composting of olive oil processing waste water and solid residue. Communications-in-Soil-Science-and-Plant-Analysis. 1995, 26: 15-16, 2461-2472; 10 ref.

Canali, S.; A. Trinchera; F.Intrigliolo; L. Pompili; L. Nisini; S. Mocali and B. Torrisi. Effect of long term addition of Composts and poultry manure on soil quality of citrus orchards in Southern Italy. Biology-and-Fertility-of-Soils. 2004; 40(3): 206-210.

Cayuela, M.L.; M.P. Bernal and A. Roig. Composting olive mill waste and sheep manure for orchard use. 2004Compost-Science-and-Utilization; 12(2): 130-136.

Cegarra, J.; J.A. Alburquerque; J. Gonzalvez and D. Garcia. Composting of two-phase olive Pomace. 2004Olivae-. 2004; (101): 12-17

Chapman, H.D. and P.F. Pratt. Methods of Analysis for Soils, Plants and Waters. Univ. of California, 1978Div. Agric. Sci., priced Pub. 4034.

Duncan, D. B. Multiple range and multipleF. Tests biometrics, 1955 11: 1- 24.

El- Dsouky, M.M.; K.K. Attia and A.M. El-Salhy. Influnce of elemental sulphur application and biological fertilization on nutrient status and fruiting of Balady Mandarin trees and King"s Ruby grapevines. 2002 The 3 rd Scienttific Conf. of Agric. Sci., Assiut, Oct.20- 22, (III) : 385- 403.

El-Salhy, A. M., H. Marzouk M. M. and M. M. El-Akkad. Bio fertilization and elemental sulphur effects on growth and fruiting of King's Ruby and Red Roomy grapevines. 2006 Egypt. J.Hort.,vol.33, pp 29- 43.

El-Sayed, A. S. M. Effect of conversion to organic farming on yield, fruits and oil quality of olive. 2009 Ph. D. Dissertation Faculty of Agriculture Ain Shams University, Egypt.

Eman, S.A.; W.M. Abd El-Messeih and G.B. Mikhael. Using of natural raw material mixture and magnetite raw (magnetite iron) as substitute for chemical fertilizers in feeding "Le Conte" pear trees planted in calcareous soil. 2010 Alex. Sci. Exchange J., vol.31(1): 51 – 62.

Haggag, L.F.; M.A. Azzazy and M.A. Maksoud. Effect of biofertilizers "phosphorine" on phosphorous content and dry matter of guava seedlings growing in sandy soil conditioned with Composted town refuse. 1994 Annals-of-Agricultural-Science-Cairo. 1994, 39: 1, 345-353; 12 ref.

Harhash, M.M. and G. Abdel-Nasser. Effect of organic manures in combination with elemental sulphur on soil physical and chemical characteristics, yield, fruit quality, leaf water contents and nutritional status of Flame seedless grapevines. II- Yield, fruit quality, leaf water contents and nutritional status. 2000 J. Agric. Sci. Mansoura Univ., 25 (5): 2819.

Helail, B.M.; Y.N. Gobran and M.H. Moustafa. Study on the effect of organic manure source, method of organic manure application and biofertilizers on tree growth leaf mineral contents, fruiting and fruit quality of Washington Navel orange trees. 2003 Egypt J. Appl., Sci., 18 (4A): 297- 320.

Jackson, M.H. Soil Chemical Analysis. 1973 Prentice Hall . Inc. N Privatle Limited and New Delhi.

Manning, D.A.C. Mineral sources of potassium for plant nutrition. 2010 A review article. Agronomy for sustainable develop.30 :208-294.

Ministry of Agriculture, Economic Affairs Sector, the central of the Agricultural Economy, 2010-2011 Ministry of Agricultural.

Smith B. L. Microorganisms in soil benefit growth and yield of banana. Nitropika 1998 Bullutien, (299):22-25.

Smith, W.H., K.L. Campbell (ed.); W.D. Graham (ed.) and A.B. Bottcher. Beneficial uses of Composts in Florida. Environmentally sound agriculture. 1994 proceedings of the second conference, Orlando, Florida, USA, 20-22 April 1994. 1994, 247-253; ASAE Publication No. 04-94; 4 ref.

Snedecor, G.W. and W.G. Cochran. Statistical methods . 7th ed. 1980 Iowa State Univ. Press, Ames, Iowa, U.S.A. pp. 507.

Soliman- Mona, G. Response of banana and guava plants to some biological and mineral fertilizers. 2001 M.Sc. Thesis. Fac. Agric. Alex. Univ. Egypt.