Egypt. J. Hort. **Vol. 48**, No.2, pp. 241-255 (2021)

Egyptian Journal of Horticulture
https://ejoh.journals.ekb.eg/

A Comparison of Some Traditional and Nontraditional Organic Fertilizers for Murcott Tangerine Trees Production and Fruit Quality

Noha A. I Mansour and Mohamed A. Nasser
Department of Horticulture, Faculty of Agriculture, Ain Shams University, P.O. Box 68, Hadayek Shoubra, Cairo, Egypt.

THIS study was conducted during 2017/2018 and 2018/2019 seasons to assess the efficacy of some types and levels of nitrogen on vegetative growth, mineral content, yield and fruit quality of 5 years old Murcott tangerine trees (*Citrus reticulate*, Blanco.) budded on Volkamer lemon rootstock and cultivated in "Hegazi orchard" located in Cairo to Alexandria desert road, Egypt at 2.5 × 5m apart. The experiment contain two factorsThe first factor was added nitrogen at two levels i.e., 90 and 120 kg actual N/fed while the second factor was added 5 types of nitrogen i.e., 100% Mineral nitrogen fertilizer (MNF), 50% Commercial plant residues compost (CRC) +50% (MNF), 50% Bagasse compost (BC) +50% (MNF), 50% Waterhyacinth compost (WHC) +50% (MNF) and 50% Chicken manure (CHM) +50% (MNF). A great increase in fruits number, fruit weight, yield, pulp weight, juice weight, pulp: fruit %, juice: pulp %, ascorbic acid and (N, K, Zn leaf content) were recorded by120 Kg actual N/fed. Generally, 50% WHC + % 50 MNF and 50 % CHM + %50 MNF gave the highest values of most characters followed closely by control. Therefore, it could be recommended by fertilizing young Murcott trees with (120 Kg actual N/fed) added as (50%WHC + %50 MNF) or (50 % CHM + %50 MNF) enhanced yield, fruit quality and it is an effective method for get rid of Water hyacinth weed by easier way.

Keywords: Bagasse compost, Chickenmanure, Commercial plant residues compost, Fruit quality, Mineral nitrogen fertilizers, Murcott tangerine trees, Waterhyacinth compost, yield.

Introduction

Citrus is genus belongs family Rutaceae which included various varieties such as sweet orange, mandarins group, lime, sour orange, grapefruits etc. In Egypt the cultivation of citrus is a very long date. Nowadays, citrus area has increased rapidly reached about 184569.84ha, about 167777.81ha of them are fruitful producing (4245684 ton) around 36.37 % of the total production of fruit trees in Egypt while, the export reached 1.76 million ton. On the other way, the total fruiting area of mandarin and tangerine is 36517.62 ha producing 860458 ton (Agricultural Statistics Institute, 2019). The total exported from mandarin and tangerine reached about 119334 tons accordingto (http://www.fao.org/faostat/ar/#data/TP, 2019)

Murcott is thought to have come out of the United States of Agriculture Department USAD during citrus breeding program in Florida around 1916. Mostly, Murcott is a cross between a tangerine and sweet orange. At the present time, the fruit is commercial know under the name "Honey Tangerine" or "Murcott"(Fikry et al., 2020). Murcott tress are mild vigorous, the fruit is seedy and medium size whereas, the diameter around 5-7 cm. Peel color is yellow – orange, while the pulp is orange color with excellent

Corresponding author: Noha A.I. Mansour, E-mail: noha_mansour@agr.asu.edu.eg, Tel. 01003813704
(*Received* 10/06/2021, *accepted* 21/06/2021)
DOI : 10.21608/ejoh.2021.80073.1176

quality for fresh market. The fruit matures and harvests from January until March considering it the latest maturing tangerine cultivar (Stephen & Larry, 2012 and Abobatta, 2019).

Conventional citrus farms depended on commercial chemical fertilizers like ammonium nitrite, urea, superphosphate, potash etc. Many investigations proved that the repeated addition from chemical fertilizers may cause degradation of soil fertility (Shimbo et al., 2001). Nitrogen requirements are usually higher than other major nutrients for sustainable agriculture production (Otieno et al., 2009). Adjusting nitrogen demanded for citrus trees is considered an essential and significant factor for enhancing productivity and quality (Abo El-Komsan et al., 2003).

Using organic manure fertilizers improves all soil characters such as: organic carbon, microorganisms, soil structure and nutrient status finally by sure increases the yield. In fact different kinds of organic manure fertilizers are inexpensive and operant as an excellent alternate source for mineral nitrogen fertilizers in sustainable agriculture production, although its availability remains a very necessary factor due to its huge nature (Beckman,1973). Traditional organic fertilizers, which produced from farm residues like, farm yard manure, chicken manure, cow manure, cattlemanure and compost often contains suitable levels of different nutrient especially from N and P. (Shabani et al., 2011). From several years traditional composting of organic wastes has been common to increase crop quality, productivity and improved soil structure (Abu Talkah, 2015).

In fact usage of non-traditional organic materials like weed (Water hyacinth) and some specific plant residues like (Bagasse) as a compost save nutrients for crops and it is an effective method for get rid of them by easier way than any other alternate method (Barzegar et al., 2002, Mashavira et al., 2015).

Eichornia crassipes (Mart) commonly named Water hyacinth belongs to family Pontederiaceae. (Agunbiade et al., 2009). *Eichornia crassipes* mostly found in tropical and subtropical regions. Mart is a free-floating aquatic weeds and in all over the world considered as a source of inconvenience because it has a classy growth with large biomass and rapidly multiply cover water surface causing a lot of problems (Villamagna and Murphy, 2009). Water hyacinth is free available, so it could be easy composting and using as an organic soil amendment to solve partially the passive effects of this weed on socio-economic and aquatic ecosystems (Sanni and Adesina, 2012). On tomato Mashavira et al., (2015) discussed the efficiency of fertilizing with Water hyacinth on increase soil fertility and yield without exposure the consumers health. They found that heavy metal content increased by the increasing in Water hyacinth compost rate especially for Zn, Cu, Pb and Ni but all concentrations of this elements were within the allowably range in tomato fruits whereas Ni, Pb, Cu, and Zn concentrations in fruits were 90%, 85%, 93% and 86% respectively lower than the Codex Alimentations Commission permissible levels of heavy metals in vegetables.

Sugarcane is one of the world's oldest and greatest crop(Choudhary et al., 2016). In Egypt most of sugarcane plantations are focused in Upper Egypt especially in: El Menia, Sohag, Qena, Luxor and Aswan governorates (Hamada, 2011). In Egypt, El Haggar and El Gowini, (2005) pointed out that, during sugar production process around 30% bagasse, 3.5% filter mud/cake and 0.4% furnace ash were generated

Bagasse is the by-product of sugarcane industries during the extraction of juice from cane. It is dry pulpy residue and fibrous in nature. Bagasse contains mainly portion as cellulose (47–52%), hemicellulose (25–28%), and lignin (20–21 %,) and also it contains sugar, which is responsible for fast bio-degradable within 3 months (Rocha et al., 2011). On wheat, (Barzegar et al., (2002) pointed out that the impact of composted bagasse, farmyard manure and wheat straw on increasing yield was 22, 14 and 3% over the control.

This investigation seeks to assessthe efficacy of two nitrogen levels (90 and 120 kg actual N/fed) and comparison the effect of replacement 50% of two mineral N levels by traditional organic fertilizers as (commercial compost and chicken manure) and non-traditional organic fertilizers as Water hyacinth compost and bagasse compost for young Murcott tangerine trees production and fruits quality.

Materials and Methods

This investigation has been designed to assess the efficacy of some types and levels of N fertilization on some vegetative growth parameters, leaf mineral content, productivity and quality of Murcotttangerine trees (*Citrus reticulata,* Blanco.) during 2017/2018 and 2018/2019 seasons. Murcott tangerines trees were 5 years old budded on Volkamer lemon (*C.Volkameriana*) rootstock and cultivated in "Hegazi orchard" located in Cairo to Alexandria desert road (https://goo.gl/maps/DnUm1XPETsC7FEUS6) , Egypt under 62% shading net at 2.5 × 5m apart irrigated by drip irrigation system.Soil samples were taken from 30-60 depth from soil surface for soil physical and chemical analysis according to (Wilde et al., 1985). Soil properties weretabulated in Tables 1 and 2.

A field factorial experiment was carried out consist of two nitrogen levels [90 and 120 kg actual N/fed equal (270 and 360 g N/tree/season)] and 5 types of nitrogen fertilizers : 100% Mineral nitrogen fertilizer (MNF), 50% Commercial plant residues compost (CRC) +50% Mineral nitrogen fertilizer, 50% Bagasse compost (BC) +50% Mineral nitrogen fertilizer, 50% Water hyacinth compost (WHC) +50% Mineral nitrogen fertilizer and 50% Chicken manure (CHM)+50% Mineral nitrogen fertilizer in a randomized complete block design with four replicate, each replicate included one tree.

Water hyacinth compost preparation

Water hyacinth weeds were collected from river Nile side in Giza governorate then the roots were separated and excluded because roots had high concentrations from toxic elements like, Cd, Pb, Zn, and Ni. Plant material was chopped into small pieces about 5-7 cm, this step make fermentation to be faster, then composted in soil around 3 months under shade. After every layer, water was sprinkled in order to keep moisture according to the protocol pointed out by Tumuhairwe et al., (2009). Bagasse compost was kindly provided by some personal communications. Other organic materials (Commercial plant residues compost and Chicken manure) were got from the same farm for each year. Composition of all organic materials was presented in Table 3.

TABLE 1. Soil physical properties.

Organic matter	Particle size distribution			
	Sand	Silt	Clay	Soil
%	%	%	%	Texture
0.51	94.8	2.0	3.2	Sandy

TABLE 2. Soil chemical properties.

pH	E.C milimos/cm	Saturation soluble extract		
		Soluble cations (mg/100g)		
		Ca^{++}	Mg^{++}	Na^{+}
8.13	0.37	746	36	19

Available macronutrients (mg/100g)			Available micronutrients (ppm)		
N	P	K	Fe	Zn	Cu
120	1.04	12	2.4	4.3	1.3

TABLE 3. Composition of different organic materials:

Properties	Chicken manure	Commercial Compost	Water* hyacinth compost	Bagasse compost
(1:10) pH value	8.55	7.00	6.00	5.8
EC value (1:10) (mmohs cm)	5.55	7.00	2.35	1.00
(%) Organic matter	60.00	35.0	39.55	44.2
(%) Total nitrogen	2.60	1.50	2.00	1.5
(%) K	0.87	1.23	0.52	0.45
(%) P	0.60	0.50	0.24	0.35

* Water Hyacinth Compost contains some heavy metal such as (0.300ppm Zn, 0.199 ppm Ni, 0.700 ppm Cu, 0.0001 ppm Pb, these concentration were within the permitted levels (according to Salwa and Usrya 2019).

Half dose from two examined levels of nitrogen (90 and 120 kg actual N/fed) were added as organic materials, once in early February in each season as a ditch (25-30cm) under the drippers of selected trees. The rest of nitrogen were added as mineral nitrogen through fertigation system from commercial nitrogen fertilizers like [calcium nitrate (15.5%) ammonium sulfate (20.5%) and ammonium nitrate (33.5%)] according to farm fertilization program. Other features of trees control followed conventional orchard practices.

The reacting of the Murcott tress to the different fertilization treatments were assessed through the following parameters:

Growth measurements and leaf mineral content

Leaf samples: Twenty mature leaves of the spring growth cycle were collected in September (leaves were more than 5 months old. Leaf area was measured by using model 3100 area meter. Total Chlorophyll content was recorded by SPAD – 502 MINOLTA chlorophyll meter.

Leaf samples were cleaned then dried in oven at 70C° until constant weight. Dried leaf samples were grounded then digested to determine N, P, and K by Micro-Kjeldahlmethod, spectrophotometer and flame photometer, respectively (Jackson, 1973) and Fe, Zn, Mn by an atomic absorption (Cottenie et al., 1982).

Yield

At the commercial harvesting time (mid-February) in 2017/2018 and 2018/2019 seasons, fruits on each tree were counted then twenty five fruits from each replicate were picked out to get the average of fruit weight of each treatment. Then the total yield (kg/tree) and (ton/fed) were estimated. For each season, ten fruits / tree were randomly taken for the assessment fruit physical and chemical properties:

Fruit physical properties

Peel thickness, pulp weight, juice weight, were determined and then calculated pulp: fruit % and juice: fruit %.

Fruit chemical properties

The total soluble solids (TSS) were determined by means of hand refractometer model HR-110. The titratable acidity was determined by titration as mg anhydrous citric acid per 100 milliliters of juice and the ascorbic acid content milligrams /100 milliliters of juice were determined according to A.O.A.C.,(1984) (1995) respectively. Then TSS / Acid ratio was calculated

Statistical analysis

A one-way analysis of variance (ANOVA) was restricted to assessment the efficiency of the different fertilizer treatments on the measurements. Treatments means were separated and compared according to Snedecor and Cochran, (1972) using the least significant differences (LSD) at 0.05 level of significance. The statistical analysis was performed using SAS version 9.13040

Results and Discussion

Effect on leaf chlorophyll and leaf area

Results in Table 4 present the effect of nitrogen levels and types and their interaction on leaf chlorophyll and leaf area in 2017/2018 and 2018/2019. Data revealed that in both seasons, values of leaf chlorophyll responded similarly without any significant difference between them under two levels of nitrogen (90 and 120 kg actual N/fed), all nitrogen types and their interaction.

Leaf area was affected insignificantly by nitrogen levels during the two growing seasons. Whereas, it was affected significantly by nitrogen types in the two seasons, while T_3:50%BC + 50% MNF recorded the significant leastvalues. On the other hand T_5:50% CHM+ 50 % MNF gave the significant maximum value followed closely by T_1 (control) especially in the second season. In the second season, the interaction pointed out that the significant least values were observed by T_3:50% BC+ 50 % MNF under any levels of nitrogen (90 or120 kg actual N/fed) followed by T_2 and T_4 under the first level of nitrogen (90 kg actual N/fed), other combinations gave more or less similar significant higher values.

These findings are in agreement with those reported by Sanni and Adesina, (2012) indicted that fertilizing with water hyacinth manure significantly increased vegetative growth and yield of *Celosia argentea* L (Lagos Spinach) may be explain by water hyacinth manure contained and released some nutrients like N and Mg whereas, these nutrients are essential for formation of chlorophyll for photosynthesis in plants which reflected on different vegetative growth parameters. El-Atbany and Byan, (2019) they revealed that fertilizing sweet pepper plants with 100% water hyacinth compost increased plant length, leaf area, plant fresh and dry weight. Fikry et al., (2020) pointed out that, Murcott tangerine trees fertilized with 75% (N) mineral + 25% (N) organic as chicken manure + 150 ml Em[1]/tree/year recorded the highest values of leaf area comparing to the control (Fertilization at 100% of the recommended N rate completely via inorganic).

TABLE 4. Effect of nitrogen levels and types on leaf chlorophyll and leaf area of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons.

	Nitrogen levels (kg actual N/fed)					
Nitrogen types	**N_1 :90**	**N_2 :120**	**Mean**	**N_1 :90**	**N_2 :120**	**Mean**
	leaf chlorophyll (SPAD)			**Leaf area (cm^2)**		
2017/2018 season						
T_1: 100% MNF* (control)	72.23a	74.32a	73.28A	33.78a	33.56a	33.67AB
T_2:50%CRC** + 50% MNF	82.15a	75.81a	78.98A	28.67a	31.22a	29.94AB
T3:50%BC*** + 50% MNF	78.36a	82.88a	80.62A	26.22a	29.00a	27.61B
T_4:50%WHC**** +50% MNF	78.88a	78.16a	78.52A	33.56a	35.00a	34.28AB
T_5:50% CHM***** + 50 % MNF	75.17a	74.67a	74.92A	36.67a	36.89a	36.78A
Mean	77.36A\	77.17A\		31.78A\	33.13A\	
2018/2019 season						
T_1: 100% MNF* (control)	72.23a	74.32a	73.28A	35.76a-c	36.29ab	36.03AB
T_2:50%CRC** + 50% MNF	81.86a	75.64a	78.75A	28.85cd	31.45a-d	30.15CD
T_3:50%BC*** + 50% MNF	78.07a	80.43a	79.25A	26.65d	27.78d	27.22D
T_4:50%WHC**** +50% MNF	81.26a	78.58a	79.92A	30.21b-d	33.87a-d	32.04BC
T_5:50% CHM***** + 50 % MNF	75.17a	77.00a	76.08A	37.65a	36.66ab	37.15A
Mean	77.72A\	77.19A\		31.82A\	33.21A\	

In each season, Means of each of nitrogen levels, nitrogen types or their interactions having the same letter (s) are not significantly different according to LSD at 5% level.

*MNF: Mineral nitrogen fertilizer, **CRC: Commercial plant residues compost, ***BC: Bagasse compost, ****WHC: Water hyacinth compost, *****CHM: Chicken manure.

Effect on fruits number, fruit weight and yield

Data in Table 5 present the effect of nitrogen levels and types and their interaction on fruits number, fruit weight, and yield in 2017/2018 and 2018/2019. Results pointed out that in both seasons the three parameters were affected significantly by nitrogen levels whereas, 120 Kg actual N/fed gave the higher values than 90 Kg actual N/fed. Fruits number, fruit weight and yield were affected significantly by nitrogen types in general, 100% mineral nitrogen, 50% WHC + %50 MNF and 50 % CHM + %50 MNF gave the higher values than 50% CRC + %50 mineral N and 50%BC + %50 MNF. Interaction results indicated that, in most cases expect some expectations the significant highest values were recorded by 100% MNF (control) , WHC + %50 MNF or 50 % CHM + %50 MNF treatments under the second level of nitrogen.

In this respect Freddy, (2009) reported that, water hyacinth improved dry matter yield of maize so it could be recommended by using water hyacinth as an assessed input for agriculture production. While Seoudi, (2013) concluded that fertilizing Cowpea plants with water hyacinth and banana wastes compost increased yield and decreased chemical fertilizers requirements, cost and environmental pollution.

Effect on fruit physical properties

Results in Table 6 present the effect of nitrogen levels, types and their interaction onfruit physical properties. Peel thickness was significantly affected by nitrogen levels, nitrogen types and their interaction in the second season only T_3 (50%BC + %50 MNF) under 120 Kg actual N/fed gave the significant least peel thickness values.

In the two seasons data indicated that, fertilizing with the high level of nitrogen (120 Kg actual N/fed) gave the significant highest values of pulp weight. Regarding the effect of N types, in the second season only T_1, T_4 and T_5 gave the significant highest values of pulp weight. From interaction it could be observed that all nitrogen types (T_1:T_5) under the second level of nitrogen gave the significant highest values of pulp weight except T_2 in the two seasons and T_3 in the second season.

Fertilizing with the second level of N (120 Kg actual N/fed) gave the significant highest values of Juice weight. With respect to nitrogen types the highest values of juice weight were obtained by T_5 (50% CHM + 50% MNF) in the two seasons followed closely by T_4 (50% WHC + 50% MNF) in the second season only. From the interactions results in two seasons the significant highest values of juice weight were recorded by T_4 and T_5 under the second level of nitrogen fertilizing.

Results concerning pulp: fruit % was affected by nitrogen levels in second season only whereas, trees fertilized with the high level of N (120 Kg actual N/fed) gave the significant highest values. Generally, T_5 (50% CHM + 50% MNF) gave the highest values of pulp: fruit %. Regarding the interaction, T_2 under N_1, $_2$ and T_3 under the N_1 gave the significant least values of pulp: fruit % especially in the second season.

Regarding juice: fruit %, nitrogen levels had insignificant difference in the two seasons. In respect nitrogen types T_5 (50% CHM + 50% MNF)showed significant highest value in the first season only followed closely by T_4 (50% WHC + 50% MNF). From the interaction, T_1 and T_3 under N_1 gave the significant least values of juice: fruit % especially in the first season. Other treatments in the two growing seasons gave more or less similar values with the same statically stand point.

In this concern Marzouk and Kassem, (2011) proved that the application of organic manures or its supplementation with mineral fertilizers indicated an enhancement in Zaghloul dates fruits physical properties especially fruit color, weight and size compared with mineral fertilization alone.

Effect on some fruit chemical properties

Results in Table 7 present the effect of nitrogen levels and types and their interaction on some fruit chemical properties in 2017/2018 and 2018/2019.

All studied fruit chemical properties were insignificantly affected by nitrogen levels in the two growing seasons except with ascorbic acid in the second season whereas, N_2 (120 Kg actual N/fed) gave higher values of ascorbic acid than N_1 (90 Kg actual N/fed). Concerning nitrogen types, the significant least values of most fruit chemical properties were showed with T_3 (50% BC + 50% MNF) especially in the first seasons with TSS% and in the two seasons with ascorbic acid. Under different fruit chemical properties, other treatments in the two growing seasons gave more or less similar values with the same statically stand point. Regarding the interaction, the significant least values of TSS and ascorbic acid were observed when fertilized with T_3 under N_2 in the first season whereas, in the second season fertilized with T_3 and T_4 under N_1 gave the significant least values of ascorbic acid.

TABLE 5. Effect of nitrogen levels and types on fruits number, fruit weight and yield of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons.

Nitrogen types	Nitrogen levels (kg actual N/fed)											
	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean
	Fruits number /tree			Fruit weight (g)			Yield kg/tree			Yield Ton/feddan		
2017/2018 season												
T_1: 100% MNF* (control)	246.0ab	293. 3a	269. 7AB	169. 7c	206. 7a	188.17A	41.8b	60.6a	51.2A	12.5b	18.2a	15.4A
T_2:50%CRC** + 50% MNF	233. 3ab	251. 7ab	242.5AB	162. 8c	172. 8c	167.78B	37.9b	43.5b	40.7B	11.4b	13.1b	12.2B
T3:50%BC*** + 50% MNF	224. 7b	242. 0ab	233.3B	161. 3c	174. 5bc	167.90B	36.2b	42.1b	39.2B	10.9b	12.6b	11.8B
T_4:50%WHC**** +50% MNF	262. 7ab	296. 7a	279. 7A	162. 2c	198. 7ab	180.45AB	42.6b	59.0a	50.8A	12.8b	17.7a	15.2A
T_5:50% CHM***** + 50 % MNF	258. 3ab	300. 0a	279.2A	163. 3c	206. 1a	184.72A	42.2b	61.8a	52.0A	12.7b	18.6a	15.6A
Mean	245. 0B\	276.7A\		163.9B\	191.7A\		40.1B\	53.4A\		12.0B\	16.0A\	
2018/2019 season												
T_1: 100% MNF* (control)	264. 7bc	281.0ab	272.8B	162. 1a-c	181. 1ab	171.6A	42.9bc	50.9ab	46.9A	12.9bc	15.3ab	14.1A
T_2:50%CRC** + 50% MNF	213.0ef	233.3de	223.2D	145. 5c	142. 2c	143.8B	31.0d	33.2cd	32.1B	9.3d	10.0cd	9.6B
T3:50%BC*** + 50% MNF	203. 3f	198. 7f	201. 0E	146. 6c	153. 2bc	149. 9B	29.8d	30.4d	30.1B	8.9d	9.1d	9.0B
T_4:50%WHC**** +50% MNF	280. 3ab	295.67a	288. 0A	160. 6a-c	185. 8a	173.2A	45.0ab	55.0a	50.0A	13.5ab	16.5a	15.00A
T_5:50% CHM***** + 50 % MNF	255. 0cd	259. 0bc	257. 0C	171. 3a-c	189. 0a	180.2A	43.7bc	49.1ab	46.4A	13.1bc	14.7ab	13.9A
Mean	243.3B\	253.5A\		157.2B\	170.3A\		38.5B\	43.73A\		11.54B\	13.12A\	

In each season, Means of each of nitrogen levels , nitrogen types or their interactions having the same letter (s) are not significantly different according to LSD at 5% level.
*MNF: Mineral nitrogen fertilizer, **CRC: Commercial plant residues compost, ***BC: Bagasse compost, ****WHC: Water hyacinth compost, *****CHM: Chicken manure

TABLE 6. Effect of nitrogen levels and types on some fruit physical properties of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons.

Nitrogen types	Nitrogen levels (kg actual N/fed)														
	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean
	Peel thickness (mm)			pulp weight (g)			Juice weight (g)			Pulp: fruit (%)			Juice: fruit (%)		
2017/2018 season															
T_1: 100% MNF* (control)	2.32a	2.37a	2.34A	134.1c	171.1ab	152.6A	93.0de	121.7ab	107.3B	79.0a	82.8a	80.9A	54.8bc	58.8a-c	56.8B
T_2:50%CRC** + 50% MNF	2.45a	2.59a	2.52A	133. 3c	142.2bc	137. 8A	95.0c-e	98.3cd	96.7C	81.9a	82.0a	81.9A	58.4a-c	57.3a-c	57.9B
T3:50%BC*** + 50% MNF	2.44a	2.35a	2.40A	129.7c	147.2a-c	138. 4A	81. 1e	111.7bc	96.4C	80.4a	84.3a	82.3A	50.3c	64.2ab	57.3B
T_4:50%WHC**** +50% MNF	2.36a	2.37a	2.36A	137.2c	169. 8ab	153.5A	98.9cd	118.9ab	108.9B	84.6a	85. 4a	85.0A	61.0a-c	59.9a-c	60.4AB
T_5:50% CHM***** + 50 % MNF	2.06a	2.29a	2.18A	137.2c	173. 3a	155.3A	110.0b-d	135.0a	122.5A	84.1a	84.1a	84.1A	67.5a	65.5ab	66.5A
Mean	2.33A\	2.39A\		134.31B\	160.73A\		95.6B\	117.1A\		82.0A\	83.7A\		58.4A\	61.2A\	
2018/2019 season															
T1: 100% MNF* (control)	3.06a	2.83a	2.95A	132.0b-d	155. 9ab	144.0A	87.3c-e	96.7 b-d	92.0B	81.6ab	86.0a	83.8AB	54.1a	53.5a	53.8B
T2:50%CRC** + 50% MNF	3.01a	2.77a	2.89A	117. 8d	114. 8d	116.3B	91.7c-e	84.4de	88.1BC	81.0b	80.7b	80.9B	63.1a	59.4a	61.2A
T3:50%BC*** + 50% MNF	2.44ab	1.84b	2.14B	118. 2d	126. 0cd	122.1B	83. 6e	84.4de	84.0C	80.7b	82.2ab	81.5B	57.0a	55.1a	56.1AB
T4:50%WHC**** +50% MNF	3.01a	2.47ab	2.74A	131. 2b-d	151. 3a-c	141.3A	98.9bc	117.2a	108.1A	81.7ab	81.5ab	81.6B	61.6a	63.2a	62.4A
T5:50% CHM***** + 50 % MNF	2.97a	2.97a	2.97A	142. 4a-d	163. 0a	152.7A	108.9ab	115.0a	112.0A	83.2ab	86.2a	84.7A	63.6a	61.6 a	62.6A
Mean	2.90A\	2.58B\		128. 3B\	142.2A\		94.1B\	99.6A\		81.6B\	83.3A\		59.9A	58.6A	

In each season, Means of each of nitrogen levels , nitrogen types or their interactions having the same letter (s) are not significantly different according to LSD at 5% level.
*MNF: Mineral nitrogen fertilizer, **CRC: Commercial plant residues compost, ***BC: Bagasse compost, ****WHC: Water hyacinth compost, *****CHM: Chicken manure

TABLE 7. Effect of nitrogen levels and types on fruit chemical properties of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons.

Nitrogen types	Nitrogen levels (kg actual N/fed)											
	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean
	T.S.S%			Acidity%			T.S.S/acid ratio			Ascorbic acid (mg/ 100ml juice)		
2017/2018 season												
T_1: 100% MNF* (control)	13.67ab	13.83a	13.75A	0.77a	0.74a	0.75A	17.80a	18.75a	18.27A	38.32ab	38.53ab	38.43AB
T_2:50%CRC** + 50% MNF	13.17ab	12.83ab	13.00AB	0.76a	0.85a	0.80A	17.36a	15.40a	16.38A	36.40ab	36.72ab	36.56AB
T3:50%BC*** + 50% MNF	13.00ab	12.50b	12.75B	0.73a	0.77a	0.75A	17.79a	16.25a	17.02A	35.77ab	34.97b	35.37B
T_4:50%WHC**** +50% MNF	13.50ab	13.23ab	13.37AB	0.80a	0.75a	0.78A	16.86a	17.66a	17.26A	37.58ab	37.40ab	37.49AB
T_5:50% CHM***** + 50 % MNF	13.50ab	13.83a	13.67A	0.87a	0.78a	0.82A	15.71a	17.80a	16.75A	38.96ab	40.24a	39.60A
Mean	13.37A\	13.25A\		0.79A\	0.78A\		17.10A\	17.17A\		37.40A\	37.57A\	
2018/2019 season												
T_1: 100% MNF* (control)	12.33a	12.83a	12.58A	0.70a	0.713a	0.71B	17.59a	18.00a	17.79A	28.00ab	28.00ab	28.00AB
T_2:50%CRC** + 50% MNF	12.50a	12.83a	12.67A	0.72a	0.72a	0.72AB	17.35a	17.79a	17.57A	29.00ab	29.00ab	29.00AB
T3:50%BC*** + 50% MNF	12.33a	12.17a	12.25A	0.72a	0.79a	0.76AB	17.08a	15.42a	16.25A	25.00b	27.00ab	26.00B
T_4:50%WHC**** +50% MNF	12.83a	12.42a	12.63A	0.76a	0.72a	0.74AB	16.97a	17.34a	17.16A	25.67b	29.33ab	27.50B
T_5:50% CHM***** + 50 % MNF	12.33a	13.50a	12.92A	0.74a	0.79a	0.77A	16.60a	17.06a	16.83A	29.67ab	32.00a	30.83A
Mean	12.47A\	12.75A\		0.73A\	0.75A\		17.12A\	17.12A\		27.47B\	29.07A\	

In each season, Means of each of nitrogen levels , nitrogen types or their interactions having the same letter (s) are not significantly different according to LSD at 5% level.
*MNF: Mineral nitrogen fertilizer, **CRC: Commercial plant residues compost, ***BC: Bagasse compost, ****WHC: Water hyacinth compost, *****CHM: Chicken manure .

These results are in harmony with those obtained by Rapisarda et al., (2010), Marzouk and Kassem, (2011), they stated that, all treatments (Mineral fertilization sources and organic sources) showed no significant differences among each other in affecting fruit chemical characteristics especially fruit juice acidity percent. On the other hand Rapisarda et al., (2010) concluded that, the higher ascorbic acid values were observed in the plot treated with citrus byproduct compost than those for mineral fertilizer. No significant differences were found in ascorbic acid content among orange fruit grown in soil amended with organic fertilizers (citrus byproduct compost, livestock manure compost and poultry manure).

Effect on some leaf macronutrients content

Results in Table 8 present the effect of nitrogen levels, nitrogen types and their interactions on N, P and K content in leaves of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons Results proved that, nitrogen content was significantly affected by nitrogen levels whereas the high level of N (120 kg actual N/fed) gave significant higher values of nitrogen content than the low nitrogen level (90 kg actual N/fed). It was clear that, T_2 (50% CRC + 50% MNF) gave the significant least values of nitrogen content in two seasons. On the other hand, T_4 (50% WHC + 50% MNF) gave the highest values of N content followed closely with other treatment except above mentioned one (T_2). Regarding the interactions, in the two seasons the significant least values of nitrogen content were observed T_1, T_2 and T_5 under fertilizing N_1 (90 kg actual N/fed). Other treatment gave more or less similar values with the same statically stand point.

Fertilizing with two levels of nitrogen affected on phosphorus content significantly, while the low nitrogen level (90 kg actual N/fed) gave the significant highest values of phosphorus content. It was clear that fertilizing with T_2 (50% CRC + 50% MNF) gave the significant highest values of phosphorus content followed by T_3 and T_5. On the other hand, the significant least values were obtained by control treatment100 % mineral and 50% WHC + 50% MNF. Regarding the interaction, fertilizing with T_2 under the first or second nitrogen level gave the maximum values of phosphorus content during two seasons.

Concerning potassium content fertilizing with N_2 (120 kg actual N/fed) gave significant higher values compared with N_1 (90 kg actual N/fed). It was clear that, adding 100% mineral nitrogen (control treatment) gave the highest values of potassium content during the two growing seasons. From the interaction it could be observed that, fertilizing with T_3 and T_4 under N_1 (90 kg actual N/fed) gave the significant least values of potassium during seasons. While the highest content of potassium were obtained by fertilizing with 100 % mineral nitrogen under any level (90 or 120 kg actual N/fed) followed by all other treatments with the same statically stand point.

The positive effect of applying water hyacinth compostmay be explained because it is considered as a source of some macronutrients i.e.: P, N and K that are necessary for plant *nutrition* (Woomer et al., 2000, Gunnarsson, Petersen, 2007). El-Atbany and Byan, (2019) pointed out that, fertilized sweet *pepper plants by water hyacinth* compost at 100% (10 ton/ fed.) recorded the highest values of K% and P% .

Effect on leaf micronutrients content

Results in Table 9 present the effect of nitrogen levels, nitrogen types and their interactions on Fe, Zn and Mn content in leaves of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons

Results pointed out that, iron content was significantly affected by nitrogen levels in the two seasons, but with contrary effect. Whereas, iron content was affected by different nitrogen types in the two seasons, while 100% mineral nitrogen treatment recorded the highest values in the two seasons followed closely by T_4 (50% WHC + 50% MNF) especially in the first seasons. The interactions showed that, in the two seasons the significant highest values of iron content were observed by T_1 (control) under fertilizing with each nitrogen level (90 or 120 kg actual N/fed). Other treatment gave more or less similar values with the same statically stand point.

Fertilizing with two levels of nitrogen affected on zinc content significantly in the first season only, while N_2 (120 kg actual N/fed) gave the significant highest values. Results showed that in the first season only zinc content was affected significantly by nitrogen types whereas, T_2 and T_4 gave the higher values than other treatments. From the interaction it could be observed that, fertilizing with T_3 & T_5 under N_1 (90 kg actual N/fed) and T_1&T_2 under N_2 (120 kg actual N/fed) gave the least values of Zn content.

TABLE 8. Effect of nitrogen levels and types on some leaf macronutrients content in leaves of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons.

Nitrogen types	Nitrogen levels (kg actual N/fed)								
	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean
	N%			P%			K%		
2017/2018 season									
T_1: 100% MNF* (control)	2.11c	2.57a	2.34AB	0.175d	0.152e	0.163C	1.74a	1.77a	1.76A
T_2:50%CRC** + 50% MNF	2.03c	2.27a-c	2.15B	0.239a	0.233a	0.236A	1.59ab	1.65ab	1.62B
T3:50%BC*** + 50% MNF	2.30a-c	2.40a-c	2.35AB	0.199b	0.175d	0.187B	1.39c	1.59ab	1.49C
T_4:50%WHC**** +50% MNF	2.30a-c	2.53ab	2.42A	0.147e	0.186b-d	0.166C	1.49bc	1.64ab	1.57BC
T_5:50% CHM***** + 50 % MNF	2.17bc	2.37a-c	2.27AB	0.195bc	0.178cd	0.187B	1.61ab	1.65ab	1.63B
Mean	2.18B\	2.43A\		0.191A\	0.185B\		1.56B\	1.66A\	
2018/2019 season									
T_1: 100% MNF* (control)	2.17c	2.55a	2.36AB	0.153bc	0.132c	0.143C	1.74a	1.68a	1.71A
T_2:50%CRC** + 50% MNF	2.13c	2.23a-c	2.18B	0.253a	0.245a	0.249A	1.50ab	1.52ab	1.51B
T3:50%BC*** + 50% MNF	2.30a-c	2.40a-c	2.35AB	0.175b	0.158bc	0.167B	1.35b	1.56ab	1.45B
T_4:50%WHC**** +50% MNF	2.40a-c	2.53ab	2.47A	0.132c	0.157bc	0.144C	1.33b	1.58ab	1.46B
T_5:50% CHM***** + 50 % MNF	2.20bc	2.57a	2.38AB	0.178b	0.153bc	0.166B	1.48ab	1.51ab	1.49B
Mean	2.24B\	2.46A\		0.178A\	0.169B\		1.48B\	1.57A\	

In each season, Means of each of nitrogen levels, nitrogen types or their interactions having the same letter (s) are not significantly different according to LSD at 5% level.

*MNF: Mineral nitrogen fertilizer, **CRC: Commercial plant residues compost, ***BC: Bagasse compost, ****WHC: Water hyacinth compost, *****CHM: Chicken manure

The optimum level of N (2.2:2.7), P (0.12:0.18) and K (1.2:1.7) Obreza et. al. (1992)

Data showed that, manganese content was insignificantly affected by nitrogen levels in the two seasons. On the other hand T_4 (50%WHC +50%MNF) gave the highest Mn content in the two seasons followed by T_5 and T_3 especially in the first season. In the same time fertilizing with T_2 (50% CRC+ 50% MNF) under N_2 (120 kg actual N/fed) gave the least values of Mn in the two seasons

These data could be explained by organic matter in all its forms – fresh substance, intermediate products and humus- improves soil physical, chemical and biological properties which finally reflected for increasing soil fertility (Woomer et al., 2000).

TABLE 9. Effect of nitrogen levels and types on some leaf micronutrients content in leaves of Murcott tangerine trees in 2017/2018 and 2018/2019 seasons.

Nitrogen types	Nitrogen levels (kg actual N/fed)								
	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean	N_1 :90	N_2 :120	Mean
	Fe ppm			Zn ppm			Mn ppm		
2017/2018 season									
T_1: 100% MNF* (control)	172.67ab	179.00a	175.83A	32.33bc	27.67d	30.00B	40.33ab	36.66b	38.50B
T_2:50%CRC** + 50% MNF	150.00cd	138.33d	144.17B	35.00a-c	32.67bc	33.83A	38.67ab	37.33b	38.00B
T3:50%BC*** + 50% MNF	134.00d	144.00cd	139.00B	25.67d	35.33a-c	30.00B	41.67ab	39.00ab	40.33AB
T_4:50%WHC**** +50% MNF	158.33bc	170.00ab	164.17A	32.00c	35.67ab	33.83A	42.00ab	45.67a	43.83A
T_5:50% CHM***** + 50 % MNF	135.00d	159.00bc	147.00B	25.33d	36.67a	31.00B	45.00a	43.33ab	44.17A
Mean	150.00B\	158.07A\		30.07B\	33.60A\		41.53A\	40.40A\	
2018/2019 season									
T_1: 100% MNF* (control)	179.33a	172.33a	175.83A	35.00ab	28.33bc	31.67A	38.00ab	42.00ab	40.00AB
T_2:50%CRC** + 50% MNF	143.67bc	127.00c	135.33CD	35.33ab	27.33bc	31.33A	38.00ab	33.00b	35.50B
T3:50% BC*** + 50% MNF	126.33c	135.00c	130.67D	22.67c	36.00ab	29.33A	38.67ab	37.00b	37.83AB
T_4:50%WHC**** +50% MNF	146.67bc	144.00bc	145.33BC	31.33a-c	32.33a-c	31.83A	39.33ab	47.67a	43.50A
T_5:50% CHM***** + 50 % MNF	160.00ab	146.00bc	153.00B	28.00bc	40.00a	34.00A	41.33ab	40.33ab	40.83AB
Mean	151.20A\	144.87B\		30.47A\	32.80A\		39.07A\	40.00A\	

In each season, Means of nitrogen levels , nitrogen types or their interactions having the same letter (s) are not significantly different according to LSD at 5% level.

*MNF: Mineral nitrogen fertilizer, **CRC: Commercial plant residues compost, ***BC: Bagasse compost, ****WHC: Water hyacinth compost, *****CHM: Chicken manure

The optimum level of Fe (60.0:120.0), Zn (25.0:100.0) and Mn (25.0:200.0) Obreza et. al. (1992).

Conclusion and Recommendation

The difference between fertilizing young Murcott trees with 50% WHC as non-traditional organic fertilizers + %50 MNF or 50 % CHM as traditional organic fertilizers + %50 MNF compared with 100% mineral nitrogen fertilizers was insignificant. Therefore these organic composts are challenger and may be a favorable alternate for chemical fertilizers especially for nitrogen. So, it could be recommended by fertilizing young Murcott trees with (120 Kg actual N/fed) added as 50%WHC + %50 MNF or 50 % CHM + %50 MNF enhanced yield, fruit quality and it is an effective method for get rid of Water hyacinth weed by easier way as well as a minimizing mineral fertilizer.

Acknowledgments

My great thanks to Hegazi Company for its support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest: There were no conflicts of interest during this work.

References

A.O.A.C. (1984) Official Methods of Analysis of The Association of The Official Analytical Chemists, 15th ed, Washington DC, USA, pp. 414- 420.

A.O.A.C. (1995) Official Method and Analysis of The Association of The Official Analytical Chemists, 16th ed, Washington DC, USA, pp. 490-510.

Abo El-Komsan, E.A., Hejab, M.Y. and Fouad-Amera, A. (2003) Response of Balady orange trees to application of some nutrients and citric acid. *Egypt. J. of Appl. Sci.* **18**, 228-246.

Abobatta, W. F. (2019) Citrus Varieties in Egypt, An Impression. *IJASR*. 1,63-66

Abu Talkah (2015) Effect of Organic Fertilizer Water Hyacinth on the Growth and Production Plant Taro (*Colocasia esculenta* L.). *J. of Environ. and Earth Sci.,* **5**, 70,74

Agricultural Statisics Institute (2019) Agricultural Statisics Institute, *Summer and Nile crop.*, Egypt, **2**, 295-315.

Agunbiade, F.O., OluOwolabi, B.I. and Adebowale, K.O. (2009) Phytoremediation potential of Eichornia crassipes in metal contaminated coastal water. *Bioresour. Technol.,* **100**, 4521–4526

Barzegar, A.R., Yousefi A. and Daryashenas A. (2002) The effect of addition of different amounts and types of organic materials on soil physical properties and yield of wheat. *Plant Soil,* **247**, 295–301

Beckman,E. O. (1973) Organic fertilization, vegetable farming luxury or necessity, *Tech. Commun*. ISHA. 29

Choudhary RL, Wakchaure GC., Minhas PS. and Singh AK.(2016) Response of ratoon sugarcane to stubble shaving, off-barring, root pruning and band placement of basal fertilizers with a multipurpose drill machine. *Sugar Tech*. **19**, 33–40

Cottenie, A., Verloo, M., Kiekens, L., Velghe, G. and Camerlynck, R. (1982) Chemical Analysis of Plants and Soils, State Univ. *Ghent, Belgium,* **63**, 44-45.

El Haggar, S.M. and El Gowini, M.M. (2005) Comparative Analysis of Alternative Fuels for Sugarcane Industry in Egypt, 1st Ain Shams International Conference on Environmental Engineering, 9-11/4/2005, Cairo, Egypt.

El-Atbany, S.A. and Byan, U.A.I. (2019) Effect of using water hyacinth compost comparing with some organic fertilizers and mineral fertilizer levels on growth and yield of sweet pepper. *J. of Hort. Sci.& Ornam. Plants,* **11**, 204-213

Fikry, A.M., Abou Sayed-Ahmed,T.A.,M.,MohsenF.S. and Ibrahim,M.M. (2020) Effect of nitrogen fertilization through inorganic, Organic and biofertilizers sources on vegetative Growth, yield and nutritional status in Murcott Tangerine trees. *Plant Arch.,* **20**, 1859-1868

FAO (2019) http,//www.fao.org/faostat/ar/#data/TP .

Freddy,R.G.(2009)Effects of manure from water hyacinth on soil fertility and maize performance. International Master Programme at the Swedish Biodiversity Centre. Master's thesis No.56, pp 6-50.

Gunnarsson, C.C. and Petersen, C.M. (2007) Water hyacinth as a resource in agriculture and energy production, A Literature review. *Waste Manag*., 27,117-129

Hamada, Y.M. (2011) Water Resources Reallocation in Upper and Middle Egypt. *Eur. Water, EW Publ.*, **33**, 33-44

Jackson, M.L. (1973) Soil Chemical Analysis, *Prentice- Hall of India Pvt. Ltd. New Delhi*. 200 p.

Marzouk, H.A. and Kassem, H.A. (2011) Improving fruit quality, nutritional value and yield of Zaghloul dates by the application of organic and/or mineral fertilizers. *Sci. Hortic.,* **127**, 249–254.

Mashavira, M., Chitata,T., Mhindu, R.L., Muzemu, S., Kapenzi, A. and Manjeru, P. (2015) The Effect of Water Hyacinth (*Eichhornia crassipes*) Compost on Tomato (*Lycopersicon esculentum*) Growth Attributes, Yield Potential and Heavy Metal Levels. *American J. of Plant Sci.*, **6**, 545-553

Obreza, T.A., A.K. Alva, E.A. Hanlon and R.E. Rouse (1992). Citrus grove leaf tissue and soil testing, sampling, analysis, and interpretation. This document is SL-115, a fact sheet of the Soil and Water Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published, June 1992, revised, October 1999.

Otieno, P.E., Muthomi, J.W.,Chemining'wa, G.N. and Nderitu, J.H.(2009) Effect of rhizobia inoculation, farm yard manure and nitrogen fertilizer on nodulation and yield of food grain legumes. *J Biol Sci.*, **9**,326-333

Rapisarda, P., Camin, F., Fabroni, S., Perini, M., Torrisi, B. and Intrigliolo, F. (2010) Influence of Different Organic Fertilizers on Quality Parameters and the δ15N, δ13C, δ2H, δ34S, and δ18O Values of Orange Fruit (*Citrus sinensis* L. Osbeck) . *J. Agric. Food Chem*., **58**,3502–3506.

Rocha, G.J.M., Martin, C., Soares, I.B., Souto-Maior, A.M., Baudel, H.M. and Moraes, C.A. (2011) Dilute mixed-acid pretreatment of sugarcane bagasse for the ethanol production. *Biomass Bioenerg,* **35**,663–670

Salwa A. El-Atbany and Usrya, A. I. Byan (2019) Effect of Using Water Hyacinth Compost Comparing with Some Organic Fertilizers and Mineral Fertilizer Levels on Growth and Yield of Sweet Pepper. J. Hort. Sci. & Ornamen. Plants, **11**, 204-213

Sanni, K.O. and Adesina, J.M. (2012) Response of water hyacinth manure on growth attributes and yield of *Celosia argentea* L (Lagos Spinach). *J. of Agr. Technol.,* **8**, 1109-1118.

Seoudi, O.A. (2013) Utilization of water hyacinth and banana wastes compost in reclamation of sandy soils for increasing growth, yield of cowpea.*J. Adv. Lab. Res. Biol*., **4**,36-45

Shabani, H., Peyvast, G.h., Olfati, J.A. and Ramezani Kharrazi, P. (2011) Effect of municipal solid waste compost on yield and quality of eggplant. *Comun. Sci*., **2**, 85-90.

Shimbo, S., Watanabe, T., Zhang, Z.W. and Ikeda, M. (2001) Cadmium and lead contents in rice and other cereal products in Japan in 1998–2000. *Sci. of the Total Enviro.*, **281**, 165– 175.

Snedecor, G.W. andCochran, W.G. (1972) Statistical Methods, 6th ed. Iowa State Univ. Press, Ames, Iowa, pp. 250-254

Stephen, H.F. and Larry,K.J. (2012) Murcott (Honey Tangerine). University of Florida. *IFAS Extension*,HS174.

Tumuhairwe, J.B., Ledin, S., Tenywa, J.S. and Ottabong E. (2009) Comparison of four low technology composting methods for market crop wastes. *Waste Manag.,* **29**, 2274-2281

Villamagna, A.M. and Murphy, B.R. (2009) Ecological and socio-economic impacts of invasive water hyacinth (*Eichhornia crassipes*), a review. *Freshw. Biol.*, 55, 282–298

Wilde, S.A., Gorey, B.B., Layer, J.G. and Voigt, J.K. (1985) Soils and Plant Analysis for Tree Culture, published by Mohan primlani, Oxford and IBH publishing Co., *New Delhi,* pp. 1- 142.

Woomer, P.L., Muzira, R., Bwamiki, D., Mutetikka, D., Amoding, A. andBekunda, M.A. (2000) Biological management of water hyacinth waste in Uganda.

مقارنة بين بعض الأسمدة العضوية التقليدية وغير التقليدية علي انتاج وجودة ثمار أشجار اليوسفي الموركيت

نهى منصور و محمد ناصر
* قسم البساتين - جامعة عين شمس - كلية الزراعة - شبرا الخيمة - القاهرة– مصر.

جريت هذه الدراسة خلال موسمي (٢٠١٨/٢٠١٧ و٢٠١٩/٢٠١٨) لتقييم فعالية بعض مصادر ومستويات النيتروجين على النمو الخضري والمحتوى المعدني والمحصول وجودة الثمار لأشجار اليوسفي الموركيت البالغة من العمر ٥ سنوات والمطعومه على أصل الفولكامريانا ومنزرعه على مسافة ٢,٥ × ٥ متر في «مزارع حجازي» الواقعة في طريق القاهرة - الإسكندرية الصحراوي، مصر. تحتوي التجربة على عاملين، العامل الأول: مستويات التسميد النتروجيني حيث تم أضافته بمستويين أضافة (٩٠ ،١٢٠ كجم نيتروجين صافي للفدان/ سنة) بينما تتضمن العامل الثاني أربعة توليفات سمادية نتروجينية (٥٠٪ كمبوست نباتي تجاري +٥٠٪ سماد نيتروجين معدني، ٥٠٪ كمبوست مصاصة القصب + ٥٠٪ سماد نيتروجين معدني، ٥٠٪ كمبوست ورد النيل +٥٠ ٪ سماد نيتروجين معدني، ٥٠٪ ذرق الدواجن + ٥٠٪ سماد نيتروجين معدني) بجانب الكنترول المعدني (١٠٠٪ سماد نيتروجين معدني) .سجلت المعاملة بالمستوي النتروجيني ١٢٠ كجم N / فدان زيادة كبير في عدد الثمار، وزن الثمار،المحصول، وزن اللب، وزن العصير، اللب إلى الثمرة ٪ ، العصير إلى اللب ٪، حامض الاسكوربيك ومحتوى الأوراق (N، K، Zn) . بشكل عام، أعطى ٥٠٪ كمبوست ورد النيل +٥٠ ٪ سماد نيتروجين معدني و٥٠٪ ذرق الدواجن + ٥٠٪ سماد نيتروجين معدني أعلى قيم لمعظم الصفات متبوعة بشكل وثيق بالمعاملة ١٠٠٪ سماد نيتروجين معدني. لذلك، يمكن التوصية بتسميد أشجار اليوسفي الموركيت بعمر ٥ سنوات بـ ١٢٠ كجم / N صافي للفدان بالتوليفة السمادية بنسبة ٥٠(٪ كمبوست ورد النيل +٥٠ ٪ سماد نيتروجين معدني) أو ٥٠ (٪ ذرق الدواجن + ٥٠٪ سماد نيتروجين معدني) حيث أدي الى زيادة المحصول وجودة الثمار كما يعتبر طريقة فعاله للتخلص من ورد النيل والاستفادة منه.