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 factors: The 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 by 120 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 getting rid of Water hyacinth weed by easier way.

Keywords: Bagasse compost, Chicken manure, 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 according to (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
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, cattle manure 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.

Sugar cane 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 assess the 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 Murcott tangerine trees (Citrus reticulata, Blanco.) during 2017/2018 and 2018/2019 seasons. Murcott tangerine 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 were tabulated 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.

| Organic matter | Particle size distribution |
|----------------|---------------------------|
|                | Sand % | Silt % | Clay % | Soil Texture |
| Organic matter | %      |        |        |              |
| Organic matter |        |        |        |              |
| Organic matter |        |        |        |              |
| Organic matter |        |        |        |              |
| Organic matter |        |        |        |              |

| pH | E.C | Saturation soluble extract | Soluble cations (mg/100g) | Available macronutrients (mg/100g) | Available micronutrients (ppm) |
|----|-----|---------------------------|---------------------------|----------------------------------|-----------------------------|
| 8.13 | 0.37 | 746 | 36 | 19 | N | P | K | Fe | Zn | Cu |
| 120 | 1.04 | 12 | 2.4 | 4.3 | 1.3 |

TABLE 1. Soil physical properties.

| pH | E.C | Saturation soluble extract | Soluble cations (mg/100g) | Available macronutrients (mg/100g) | Available micronutrients (ppm) |
|----|-----|---------------------------|---------------------------|----------------------------------|-----------------------------|
| 8.13 | 0.37 | 746 | 36 | 19 | N | P | K | Fe | Zn | Cu |
| 120 | 1.04 | 12 | 2.4 | 4.3 | 1.3 |

*Egypt. J. Hort. Vol. 48, No. 2 (2021)*
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 (25-30 cm) 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 70°C until constant weight. Dried leaf samples were grounded then digested to determine N, P, and K by Micro-Kjeldahl method, 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 $T_1$:50% BC + 50% MNF recorded the significant least values. On the other hand $T_3$: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 or 120 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) indicated 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$^{-3}$/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)         |                |           |           |       |           |           |       |
| 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   |       |
| $T_3$: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    | 28.85ed| 31.45a-d| 30.15CD   |       |
| $T_3$:50%BC**** + 50% MNF       | 78.07a         | 80.43a    | 79.25A    | 26.65A| 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 on fruit physical properties. Peel thickness was significantly affected by nitrogen levels, nitrogen types and their interaction in the second season only. T4 (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 T1, T4 and T5 gave the significant highest values of pulp weight. From interaction it could be observed that all nitrogen types (T1;T2) under the second level of nitrogen gave the significant highest values of pulp weight except T1 in the two seasons and T3 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 T5 (50% CHM + 50% MNF) in the two seasons followed closely by T4 (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 T4 and T5 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, T5 (50% CHM + 50% MNF) gave the highest values of pulp: fruit %. Regarding the interaction, T4 under N4; T3 and T5 under the N1_a 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 T1 (50% CHM + 50% MNF) showed significant highest value in the first season only followed closely by T4 (50% WHC + 50% MNF). From the interaction, T1 and T4 under N3 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, N1 (120 Kg actual N/fed) gave higher values of ascorbic acid than N3 (90 Kg actual N/fed). Concerning nitrogen types, the significant least values of most fruit chemical properties were showed with T4 (50% BC + 50% MNF) especially in the first season 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 T4 under N1 in the first season whereas, in the second season fertilized with T4 and T5 under N1 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) | Fruits number /tree | Fruit weight (g) | Yield kg/tree | Yield Ton/feuddan |
|----------------|----------------------------------|---------------------|------------------|---------------|------------------|
|                | $N_1:90$ | $N_2:120$ | Mean | $N_1:90$ | $N_2:120$ | Mean | $N_1:90$ | $N_2:120$ | Mean | $N_1:90$ | $N_2:120$ | Mean |
| 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 |
| $T_3$: 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 |
| $T_3$: 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 | 171.0a-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 | 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 |
| 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 |
| T$_3$: 50% BC$^{**}$ + 50% MNF | 2.44a | 2.35a | 2.40A | 129.7c | 147.2a-c | 138.4A | 81.1c | 111.7bc | 96.4C | 80.4a | 84.3a | 82.3A |
| T$_4$: 50% WHC$^{***}$ + 50% MNF | 2.36a | 2.37a | 2.36A | 132.7c | 169.8ab | 153.5A | 98.9cd | 118.9ab | 108.9B | 84.6a | 85.4a | 85.0A |
| T$_5$: 50% CHM$^{****}$ + 50% MNF | 2.06a | 2.29a | 2.18A | 137.2c | 173.2a | 155.3A | 110.0b-d | 125.5a | 107.8A | 84.1a | 84.1a | 84.1A |
| Mean | 2.33A | 2.39A | 2.36A | 134.3B | 160.7A | 153.5B | 95.6B | 117.1A | 108.9B | 82.0A | 83.7A | 82.0A |
| 2018/2019 season | | | | | | |
| T$_1$: 100% MNF$^*$ (control) | 3.06a | 2.83a | 2.95A | 132.0d | 155.0b | 144.0A | 87.3c-e | 96.7b-d | 92.0B | 81.6ab | 86.0a | 83.8AB |
| T$_2$: 50% CRC$^{**}$ + 50% MNF | 3.01a | 2.77a | 2.89A | 117.8d | 114.8d | 116.3B | 91.7c | 84.4d | 88.1BC | 81.0B | 80.7b | 80.9B |
| T$_3$: 50% BC$^{***}$ + 50% MNF | 2.44ab | 1.84b | 2.14B | 118.2d | 126.0cd | 122.1B | 83.6c | 84.4d | 84.0C | 80.7b | 82.2ab | 81.5B |
| T$_4$: 50% WHC$^{****}$ + 50% MNF | 3.01a | 2.47ab | 2.74A | 131.2d | 151.3a-c | 141.3A | 98.9bc | 117.2a | 108.1A | 81.7ab | 81.5ab | 81.6B |
| T$_5$: 50% CHM$^{*****}$ + 50% MNF | 2.97a | 2.97a | 2.97A | 142.4d | 163.0a | 152.7A | 108.9ab | 115.0a | 122.0A | 83.2ab | 86.2a | 84.7A |
| Mean | 2.90A | 2.58B | 2.82B | 128.3B | 142.2A | 141.2A | 94.1B | 99.6A | 98.1B | 83.3A | 83.3A | 83.3A |

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) | 2017/2018 season | 2018/2019 season |
|----------------|------------------------------------|------------------|------------------|
|                | N<sub>1</sub> : 90 | N<sub>2</sub> : 120 | Mean | N<sub>1</sub> : 90 | N<sub>2</sub> : 120 | Mean | N<sub>1</sub> : 90 | N<sub>2</sub> : 120 | Mean |
|                | T.S.S%               | Acidity%          | T.S.S/acid ratio | Ascorbic acid (mg/ 100ml juice) | T.S.S%               | Acidity%          | T.S.S/acid ratio | Ascorbic acid (mg/ 100ml juice) |
| T<sub>1</sub>; 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<sub>2</sub>; 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 |
| T<sub>3</sub>; 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<sub>4</sub>; 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<sub>5</sub>; 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 | |

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, T₁ (50% CRC + 50% MNF) gave the significant highest values of nitrogen content in two seasons. On the other hand, T₃ (50% WHC + 50% MNF) gave the highest values of N content followed closely with other treatment except above mentioned one (T₂). Regarding the interactions, in the two seasons the significant least values of nitrogen content were observed T₁, T₂ and T₃ under fertilizing N₁ (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 T₁ (50% CRC + 50% MNF) gave the significant highest values of phosphorus content followed by T₃ and T₂. On the other hand, the significant least values were obtained by control treatment100 % mineral and 50% WHC + 50% MNF. Regarding the interaction, fertilizing with T₁ under the first or second nitrogen level gave the maximum values of phosphorus content during two seasons.

Concerning potassium content fertilizing with N₁ (120 kg actual N/fed) gave significant higher values compared with N₁ (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 T₁ and T₄ under N₁ (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 compost may 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 T₃ (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 T₁ (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 N₁ (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, T₁ and T₄ gave the higher values than other treatments. From the interaction it could be observed that, fertilizing with T₁ & T₄ under N₁ (90 kg actual N/fed) and T₁ & T₄ under N₁ (120 kg actual N/fed) gave the least values of Zn content.
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 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 | \( N_1 :90 \) | \( N_2 :120 \) | Mean | \( N_1 :90 \) | \( N_2 :120 \) | Mean | \( N_1 :90 \) | \( N_2 :120 \) | Mean |
|---------------|--------------|--------------|------|--------------|--------------|------|--------------|--------------|------|
| \( N\%\) | P\% | K\% | \( N\%\) | P\% | K\% | \( N\%\) | P\% | K\% | \( N\%\) | 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 |
| \( T_{3} \): 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 | 0.156B | 1.66A |
| **2018/2019 season** | | | | | | | | | | |
| \( T_{1} \): 100% MNF* (control) | 2.17c | 2.55a | 2.36AB | 0.153bc | 0.132e | 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 |
| \( T_{3} \): 50%BC*** + 50% MNF | 2.30a-c | 2.40a-c | 2.25AB | 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 | 0.148B | 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)
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.

**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) | Fe ppm | Zn ppm | Mn ppm |
|----------------|----------------------------------|--------|--------|--------|
|                | N<sub>1</sub>;90 | N<sub>2</sub>;:120 | Mean | N<sub>1</sub>;90 | N<sub>2</sub>;:120 | Mean | N<sub>1</sub>;90 | N<sub>2</sub>;:120 |
| 2017/2018 season |
| T<sub>1</sub>; 100% MNF (control) | 172.67ab | 179.00a | 175.83A | 32.33bc | 27.67d | 30.00B | 40.33ab | 36.66b | 38.50B |
| T<sub>2</sub>; 50%CRC**+50%MNF | 150.00cd | 138.33d | 144.17B | 35.00a-c | 32.67bc | 33.83A | 38.67ab | 37.33b | 38.00B |
| T<sub>3</sub>; 50%BC***+50%MNF | 134.00d | 144.00cd | 139.00B | 25.67d | 35.33a-c | 30.00B | 41.67ab | 39.00ab | 40.33AB |
| T<sub>4</sub>; 50%WHC****+50%MNF | 158.33bc | 170.00ab | 164.17A | 32.00c | 35.67ab | 33.83A | 42.00ab | 45.67a | 43.83A |
| T<sub>5</sub>; 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<sub>1</sub>; 100% MNF (control) | 179.33a | 172.33a | 175.83A | 35.00ab | 28.33bc | 31.67A | 38.00ab | 42.00ab | 40.00AB |
| T<sub>2</sub>; 50%CRC**+50%MNF | 143.67bc | 127.00c | 135.33CD | 35.33ab | 27.33bc | 31.33A | 38.00ab | 33.00b | 35.50B |
| T<sub>3</sub>; 50%BC***+50%MNF | 126.33c | 135.00c | 130.67D | 22.67c | 36.00ab | 29.33A | 38.67ab | 37.00b | 37.83AB |
| T<sub>4</sub>; 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<sub>5</sub>; 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).
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, Wachauare 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 Govini, 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.,Mohsen.E.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., Mhinda, 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.

Egypt. J. Hort. *Vol. 48*, No. 2 (2021)
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. and Cochrane, 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. and Bekunda, M.A. (2000) Biological management of water hyacinth waste in Uganda.

*Egypt. J. Hort. Vol. 48*, No. 2 (2021)
A COMPARISON OF SOME TRADITIONAL AND NONTRADITIONAL ORGANIC FERTILIZERS …

**Egypt. J. Hort. Vol. 48, No. 2 (2021)**

A COMPARISON OF SOME TRADITIONAL AND NONTRADITIONAL ORGANIC FERTILIZERS …

Making a comparison between some traditional and non-traditional organic fertilizers in the study of some characteristics of fruits and crops for the first year of age 825 kg / ha in the nursery of the Ministry of Agriculture in the Nile Delta. The results showed that the use of compost along with the traditional treatment increased the yield and weight of the fruit, and the number of fruits. Also, the content of nitrogen in the leaves increased with the use of compost. The study recommends the use of compost in the nursery stage to increase the yield and quality of the fruit.