

## Yield and Fruit Quality of “Le-conte” Pear Trees as Affected by Compost Tea and Some Antioxidants Applications

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**Abstract:** The effects of compost tea, which abstracted by 1.5kg/10L water, as soil or foliar application at 5 liter/tree and three foliar antioxidant treatments at 1000 ppm of ascorbic acid, 200 ppm of thiamin and 200 ppm salicylic acid, in addition to the combinations between compost tea and antioxidants were studied during the two successive seasons of 2011 and 2012 on yield, fruit quality and nutrient leaf content of 'Le-Conte' pear trees. Foliar compost application recorded the highest yield (Kg/tree) and better fruit quality and higher N, P and K contents as compared to soil compost application and control ones. As regard to the effect of tasted antioxidants, ascorbic acid application recorded the highest yield/tree, best fruit quality as compared to other antioxidants and control trees. The interaction between compost tea and different antioxidant treatments revealed that foliar application of compost tea plus ascorbic acid gave the highest increment in yield/tree (Kg) and the best values of fruit quality and NPK leaf content comparing to other treatments and untreated trees.

**Key words:** Compost tea • Antioxidant • Ascorbic acid • Thiamin • Salicylic acid • Foliar and Soil application • Pear

### INTRODUCTION

"Le-Conte" pear (*Pyrus communis*) cultivar budded on *Pyrus communis* rootstock are grown and widely spread in new reclaimed lands in Egypt. The total planted area is 10514 Faddan produced 44713 Tons (Egyptian Ministry of Agriculture statistics). There is a need to offer the consumer with safety pear product by using organic fertilization. Raviv [1] reported that several organic molecules (e.g. polysaccharides and humic acid) improve soil texture through their effect on aggregation of clay particles. Also, addition of organic matter enhanced nutrient cycling and weathering of soil minerals.

Compost tea in modern terminology means compost extract brewed with microbial food source, humic, fulvic acids and catalyst amendments to promote the growth and multiplication of microbes in the tea [2].

The salicylic acid (SA) beneficial effect is accelerating the biosynthesis, translocation of sugars, plant pigments and hastening peel coloration of fruits [3, 4]. Ascorbic acid and citric acid are two natural and organic

antioxidants have auxinic action, they provided diseases control against most fungi infections on differential fruit trees [5]. These compounds have synergistic effect on improving growth and productivity of fruits [6].

Fayed [7] found that applying different organic manures on “Anna” apple trees increased leaf macro elements (NPK) contents as compared with unfertilized trees.

Abdou [8] stated that the highest shoot length and diameter, number of leaves/shoot, leaf area and fruit yield of “Le-Conte” pear was recorded by using compost (30 Kg/tree) plus bio-fertilizer plus humic acid plus compost tea treatment as compared with other organic treatments. He added that compost plus bio-fertilizer plus humic acid increased N and K in leaves. Salem, *et al.* [9] found that humic acid (HA) + compost + nitrogen fertilizers increased shoot length, diameter, number of leaves/foot, leaf area and fruit yield and weight of “Le-Conte” pear. The highest increment in shoot length and yield was recorded by HA followed by HA + compost then compost alone.

Fayed [10] on "Manfalouty" pomegranate trees, revealed that foliar application of compost tea (5 liters/tree) + ascorbic and citric acids increased juice vitamin C (mg/100 g juice) content as compared to untreated trees.

Shaaban, *et al.* [11] used foliar application of salicylic acid (SA) once, twice, thrice or four times at 50, 100, 200 or 400 ppm on "Anna" apple and found a gradual promotion on leaf area, nutrients (N, P, K and Mg), coloration % as well as yield and all quality parameters with increasing concentrations (from 50 to 400 ppm) and frequencies (from once to four times) of salicylic acid.

Recently, Aly [12] tested different fertilization methods on "Costata" persimmon and found that organic soil fertilization of compost "Biobinta" + bio-fertilizers significantly increased shoot length and diameter, fruit yield and weight and NPK leaf contents comparing to untreated trees.

The present study aimed to improving fruit quality and yield of "Le-Conte" pear (*Pyrus communis*) trees by using compost tea and some antioxidant applications.

## MATERIALS AND METHODS

This study was conducted during two successive seasons (2011 and 2012) on 10 years old of 'Le-Conte' Pear trees grafted on *Pyrus communis*, grown in clay soil (Table 1) and spaced at 4×5m apart in a private orchard at Fedemeen, Fayoum governorate. All orchard trees received the recommended regular organic fertilization.

The farm compost was added to the soil at the first week of December (20 m<sup>3</sup>/faddan at 15 cm soil depth as recommended by Salem *et al.* [9]. Thirty-six nearly uniform trees were selected for this investigation. The trees were subjected to the ordinary orchard management. Each treatment consisted of three replicates with one tree for each replicate and nine shoots (one year old) per tree and six branches of the elderly (contain spurs) were selected. Compost tea was added as foliar or soil application in (May - June - July and August) in both seasons. The dose of both treatments was 5 liter/tree for each date. The control trees received water only. In addition to compost tea application (foliar, soil and control treatments), trees were applied with either foliar antioxidant treatments (5 liter/tree) 1000 ppm ascorbic acid, 200 ppm thiamin or 200 ppm salicylic acid and water as control.

**Compost Tea Preparation:** Compost tea was extracted by soaking 15 kg of plant mature compost (Table 2) with 100 liters water + 100 cm molasses) for 7 days in a special unit, attached to air pump and the aerator provides continuous flow of air bubblers to extract compost tea until completion of the fermentation process and extract color becomes light Brown. The chemical properties of compost tea is shown in (Table 2).

The calculated total amounts of NPK elements added to the trees by soil or foliar application of 20 L compost tea (added in four equal doses 5L per tree) are 2.73 g N, 0.56 g P and 4.74 g K / tree.

Table 1: Soil analysis before and after the soil application.

| Sampling time      | PH 1:10 | Ec Ds/m | Minerals (mg/Kg) |      |        |       |      |      |      |
|--------------------|---------|---------|------------------|------|--------|-------|------|------|------|
|                    |         |         | N                | p    | K      | Fe    | Zn   | Mn   | Cu   |
| Before application | 7.75    | 0.9     | 65.45            | 0.77 | 107.24 | 14.4  | 0.91 | 2.3  | 0.99 |
| After application  | 7.80    | 0.97    | 75.00            | 3.60 | 161.66 | 17.04 | 0.86 | 5.02 | 1.22 |

Table 2: Some chemical characteristics of the used farm compost and compost tea.

| Some chemical characteristics of farm compost |                                 |                         |         |         |                        |                     |                 |           |
|---|---------------------------------|-------------------------|---------|---------|------------------------|---------------------|-----------------|-----------|
| PH (1:10)                                     | Preference Moisture at 65-70 °C | Final Moisture at 105°C | (N%)    | (P%)    | (K%)                   | Organic Matter (OM) | (C)             | C/N Ratio |
| 8.40  | 21.2                            | 1.16                    | 1.117   | 2.8     | 1.38                   | 40.5                | 23.2            | 20.7/1    |
| Some chemical characteristics of compost tea  |                                 |                         |         |         |                        |                     |                 |           |
| PH (1:10)                                     | Ec Ds/m                         | N (ppm)                 | P (ppm) | K (ppm) | Soluble anions (meq/l) |                     |                 |           |
|   |                                 |                         |         |         | HCO <sub>3</sub>       | CL                  | SO <sub>4</sub> |           |
| 7.52  | 4.42                            | 136.5                   | 28      | 237.15  | 14.5                   | 25.1                | 36.10           |           |

### During the Two Seasons, the Following Parameters Were Recorded:

**Leaf mineral contents:** Samples of 5g mature leaves (from the 4<sup>th</sup> to 6<sup>th</sup> leaves from the base of one year old shoots) per each replicate were taken on July 15<sup>th</sup>. They were cleaned, oven dried at 70°C until constant) then grind. Samples were digested using the H<sub>2</sub>SO<sub>4</sub> as described by Cottenie [13]. The extracted was used to determine the Nitrogen content (g/100g DW) by the modified microkjeldahl method as described by Plummer [14]. Also, Phosphorus content (g/100g DW) was determined colorimetrically according to the method of Jackson [15]. Moreover, Potassium content (g/100g DW) was determined against a standard using flame photometer [16].

**Yield (Kg/tree) and Fruit Parameters:** At the maturity stage of the 'Le-Conte' pear cultivar according to Salem *et al.* [9]. Yield (kg/tree) was recorded during the under our conditions. Five fruits randomly from each tree were picked to evaluate the following physical and chemical properties. Fruit weight (g), fruit size (cm<sup>3</sup>) by using water displace meter method, flesh firmness (lb/in<sup>2</sup>) two sides of the fruits by using a pressure tester (Advance Force Gorge RH13, UK) and fruit dimensions (cm) by using a veneer caliper and L/D ratio was measured. Also, TSS (%) was determined in fruit juice

sample of five fruits by using a hand refractometer (Portable Refractometer) and Total acidity % was determined in terms of anhydrous malic acid as a percentage after titration by 0.1 N sodium hydroxide using phenolphthalein as described AOAC [17].

**Peel Pigments (mg/100g of fresh weigh):** Chlorophylls-a, -b and total carotenoids were colourmetrically determined in peel samples (mg/100g fresh weigh) according to Saric *et al.* [18].

**Statistical Analysis:** The obtained data were tabulated and statistically analyzed according to the split plot design [19]. The means values were compared using LSD method at 5% level. The percentages were transferred to the arcsine to find the binomial percentages according to Steel and Torrie [20].

## RESULTS AND DISCUSSION

**Leaf Mineral Contents:** The effect of compost tea and some antioxidant treatments on NPK leaf content of "Le-Conte" pear contents during 2011 and 2012 seasons are shown in Table (3). As regard to the overage effect of compost applications, both foliar and soil applications of compost increased N, P and K of leaf as compared to

Table 3: Effect of compost tea and some antioxidant treatments on leaf N, P and K contents of Le- Conte trees during 2011 and 2012 seasons.

| Treatments                        |                | N%    |       | P%    |       | K%    |       |
|-----------------------------------|----------------|-------|-------|-------|-------|-------|-------|
|                                   |                | 2011  | 2012  | 2011  | 2012  | 2011  | 2012  |
| Application of compost tea        | Antioxidant    |       |       |       |       |       |       |
| Foliar application of compost tea | Ascorbic acid  | 2.180 | 3.000 | 0.333 | 0.480 | 1.309 | 1.915 |
|                                   | Thiamin        | 1.650 | 2.770 | 0.310 | 0.460 | 1.082 | 1.298 |
|                                   | Salicylic acid | 1.640 | 2.630 | 0.300 | 0.440 | 1.056 | 1.258 |
|                                   | Without        | 1.580 | 2.570 | 0.280 | 0.360 | 1.053 | 1.248 |
|                                   | Av.            | 1.763 | 2.743 | 0.305 | 0.435 | 1.125 | 1.430 |
| Soil application of compost tea   | Ascorbic acid  | 1.490 | 2.130 | 0.260 | 0.350 | 1.041 | 1.125 |
|                                   | Thiamin        | 1.420 | 2.070 | 0.260 | 0.350 | 1.041 | 1.086 |
|                                   | Salicylic acid | 1.410 | 1.850 | 0.260 | 0.273 | 1.032 | 1.075 |
|                                   | Without        | 1.810 | 1.830 | 0.233 | 0.273 | 1.022 | 1.276 |
|                                   | Av.            | 1.533 | 1.970 | 0.253 | 0.311 | 1.034 | 1.141 |
| Control                           | Ascorbic acid  | 1.100 | 1.800 | 0.230 | 0.253 | 1.018 | 1.065 |
|                                   | Thiamin        | 1.100 | 1.630 | 0.163 | 0.240 | 1.018 | 1.055 |
|                                   | Salicylic acid | 1.090 | 1.440 | 0.130 | 0.230 | 0.980 | 1.050 |
|                                   | Without        | 1.060 | 1.360 | 0.106 | 0.170 | 0.781 | 0.950 |
|                                   | Av.            | 1.087 | 1.558 | 0.157 | 0.223 | 0.949 | 1.030 |
| Average of Antioxidant treatments | Ascorbic acid  | 1.590 | 2.310 | 0.274 | 0.361 | 1.123 | 1.368 |
|                                   | Thiamin        | 1.390 | 2.157 | 0.244 | 0.350 | 1.047 | 1.146 |
|                                   | Salicylic acid | 1.380 | 1.973 | 0.230 | 0.314 | 1.023 | 1.128 |
|                                   | Without        | 1.483 | 1.920 | 0.206 | 0.267 | 0.952 | 1.158 |
| LSD at 5%Level for :              |                |       |       |       |       |       |       |
| Compost                           |                | 0.362 | 0.402 | 0.080 | 0.143 | 0.035 | 0.205 |
| Antioxidant                       |                | NS    | 0.278 | NS    | 0.088 | 0.031 | 0.132 |
| Compost x Antioxidant             |                | 0.463 | 0.482 | 0.121 | 0.153 | 0.054 | 0.230 |

Table 4: Effect of compost tea and some antioxidant treatments on yield and some fruit physical characteristics of Le- Conte trees during 2011 and 2012 seasons.

| Treatments                        |                | Yield/Tree (kg) |       | Fruit weight (g) |       | Fruit size (cm <sup>3</sup> ) |       | Fruit firmness (16/ln <sup>2</sup> ) |       |
|-----------------------------------|----------------|-----------------|-------|------------------|-------|-------------------------------|-------|--------------------------------------|-------|
|                                   |                | 2011            | 2012  | 2011             | 2012  | 2011                          | 2012  | 2011                                 | 2012  |
| Application of compost tea        | Antioxidant    |                 |       |                  |       |                               |       |                                      |       |
| Foliar application of compost tea | Ascorbic acid  | 35.62           | 43.84 | 164.3            | 176.0 | 144.4                         | 147.7 | 19.90                                | 18.96 |
|                                   | Thiamin        | 34.17           | 42.26 | 138.6            | 172.3 | 116.7                         | 146.7 | 21.77                                | 19.16 |
|                                   | Salicylic acid | 20.28           | 38.92 | 137.5            | 147.8 | 133.3                         | 126.7 | 21.94                                | 21.37 |
|                                   | Without        | 18.36           | 35.98 | 131.6            | 136.0 | 118.3                         | 122.0 | 22.09                                | 21.61 |
|                                   | Av.            | 27.11           | 40.25 | 143.0            | 158.0 | 128.2                         | 135.8 | 21.42                                | 20.27 |
| Soil application of compost tea   | Ascorbic acid  | 18.01           | 32.42 | 129.5            | 135.3 | 117.8                         | 121.0 | 22.37                                | 21.82 |
|                                   | Thiamin        | 15.58           | 25.91 | 125.0            | 135.1 | 103.3                         | 119.0 | 22.50                                | 22.07 |
|                                   | Salicylic acid | 15.06           | 21.45 | 122.4            | 131.5 | 103.3                         | 115.7 | 22.71                                | 22.54 |
|                                   | Without        | 13.82           | 18.90 | 118.5            | 131.5 | 84.4                          | 109.0 | 22.72                                | 23.14 |
|                                   | Av.            | 15.62           | 24.67 | 123.8            | 133.3 | 102.2                         | 116.2 | 22.57                                | 22.39 |
| Control                           | Ascorbic acid  | 13.13           | 18.12 | 117.5            | 131.3 | 100.0                         | 103.7 | 22.79                                | 23.34 |
|                                   | Thiamin        | 13.04           | 17.72 | 116.8            | 123.7 | 111.7                         | 102.3 | 22.87                                | 23.49 |
|                                   | Salicylic acid | 12.84           | 15.57 | 113.3            | 120.8 | 100.0                         | 84.6  | 23.51                                | 23.52 |
|                                   | Without        | 7.836           | 8.69  | 102.3            | 120.6 | 81.1                          | 92.3  | 23.55                                | 24.27 |
|                                   | Av.            | 11.71           | 15.02 | 112.5            | 124.1 | 98.1                          | 95.7  | 23.18                                | 23.65 |
| Average of Antioxidant treatments | Ascorbic acid  | 22.25           | 31.46 | 137.1            | 147.5 | 120.7                         | 124.1 | 21.69                                | 21.37 |
|                                   | Thiamin        | 20.93           | 28.63 | 126.8            | 143.7 | 110.6                         | 122.7 | 22.38                                | 21.57 |
|                                   | Salicylic acid | 16.06           | 25.31 | 124.4            | 133.4 | 112.2                         | 109.0 | 22.72                                | 22.48 |
|                                   | Without        | 13.34           | 21.19 | 117.4            | 129.4 | 94.6                          | 107.8 | 22.78                                | 23.00 |
| LSD at 5%Level for :              |                |                 |       |                  |       |                               |       |                                      |       |
| Compost                           |                | 1.53            | 1.57  | 13.81            | 10.16 | 5.24                          | 5.38  | 1.53                                 | 1.04  |
| Antioxidant                       |                | 1.26            | 0.93  | 9.30             | 9.93  | 5.70                          | 9.63  | NS                                   | 1.61  |
| Compost x Antioxidant             |                | 2.19            | 1.62  | 16.11            | 17.20 | 9.88                          | 16.68 | 2.61                                 | 2.78  |

the control treatment. As regard to the antioxidants, effect in overage showed no differences were detected on N or P % in the first season. But in the second season, the application of ascorbic acid alone significantly increased N, P and K leaf contents as compared to the control. As regard to the interaction between compost tea and different antioxidants foliar application of compost tea plus ascorbic acid gave the highest increment in leaf N and k contents as compared with the other antioxidant and untreated control trees.

By studding different fertilization methods the present results are in harmony with the findings of Abdou [8] on "Le-Conte" pear, Shaaban, *et al.* [11] on "Anna" apple and Aly [12] on "Costata" persimmon.

Several researches stated that foliar feeding is more efficient than soil fertilization; the result is totally true in case of micronutrients under arid and semi-arid conditions [21, 22]. El-Sayed *et al.* [23] suggested that antioxidants, such as ascorbic acid and citric acid, have auxinic action and synergistic effect on leaf mineral contents. Recently, antioxidants have been used instead of auxins and other chemicals for enhancing growth of various fruit trees.

**Yield and Fruit Physical Properties:** Results in Table (4) show the effect of compost tea and some antioxidant treatments on "Le-Conte" pear tree yield and fruit weight, size and firmness during 2011 and 2012 seasons. Foliar compost application recorded in the average the significant increased yield (Kg/tree), fruit weight and size as compared to soil compost application and control. As regard to the antioxidant effect, ascorbic acid application recorded significant average yield/tree, fruit weight and size comparing with other antioxidants used. The interaction between compost tea and different antioxidant, revealed that foliar application of compost tea plus ascorbic acid gave the highest increment in yield/tree fruit weight and size as compared to with the untreated ones control trees. As regard to fruit firmness, the application of foliar application of compost plus ascorbic acid decreased fruit firmness as compared to control.

The present results are in agreement with those of Abdou [8] working on "Le-Conte" pear, Shaaban, *et al.* [11] on "Anna" apple and Aly [12] on "Costata" persimmon who studied different fertilization methods.

Table 5: Effect of compost tea and some antioxidant treatments on some fruit physical characteristics of Le- Conte trees during 2011 and 2012 seasons.

| Treatments                        |                | Fruit length (cm) |      | Fruit diameter (cm) |      | L/D ratio |      |
|-----------------------------------|----------------|-------------------|------|---------------------|------|-----------|------|
|                                   |                | 2011              | 2012 | 2011                | 2012 | 2011      | 2012 |
| Application of compost tea        | Antioxidant    |                   |      |                     |      |           |      |
| Foliar application of compost tea | Ascorbic acid  | 8.1               | 8.1  | 6.2                 | 6.2  | 1.2       | 1.2  |
|                                   | Thiamin        | 8.6               | 8.0  | 6.0                 | 6.2  | 1.4       | 1.2  |
|                                   | Salicylic acid | 7.8               | 7.7  | 5.9                 | 6.1  | 1.3       | 1.2  |
|                                   | Without        | 7.7               | 7.5  | 5.7                 | 5.9  | 1.3       | 1.2  |
|                                   | Av.            | 8.0               | 7.8  | 6.0                 | 6.1  | 1.3       | 1.2  |
| Soil application of compost tea   | Ascorbic acid  | 7.7               | 7.2  | 5.7                 | 5.9  | 1.3       | 1.2  |
|                                   | Thiamin        | 7.8               | 7.1  | 5.7                 | 5.8  | 1.3       | 1.2  |
|                                   | Salicylic acid | 7.8               | 7.2  | 5.7                 | 5.8  | 1.3       | 1.2  |
|                                   | Without        | 7.1               | 7.1  | 5.7                 | 5.6  | 1.2       | 1.2  |
|                                   | Av.            | 7.6               | 7.1  | 5.7                 | 5.8  | 1.3       | 1.2  |
| Control                           | Ascorbic acid  | 7.7               | 6.5  | 5.7                 | 5.5  | 1.3       | 1.1  |
|                                   | Thiamin        | 7.5               | 6.6  | 5.5                 | 5.5  | 1.3       | 1.2  |
|                                   | Salicylic acid | 7.5               | 7.1  | 5.5                 | 5.4  | 1.3       | 1.3  |
|                                   | Without        | 6.7               | 6.5  | 5.47                | 5.3  | 1.2       | 1.2  |
|                                   | Av.            | 7.4               | 6.7  | 5.5                 | 5.4  | 1.3       | 1.2  |
| Average of Antioxidant treatments | Ascorbic acid  | 7.8               | 7.3  | 5.9                 | 5.9  | 1.3       | 1.2  |
|                                   | Thiamin        | 8.0               | 7.2  | 5.8                 | 5.8  | 1.3       | 1.2  |
|                                   | Salicylic acid | 7.7               | 7.3  | 5.7                 | 5.8  | 1.3       | 1.2  |
|                                   | Without        | 7.2               | 7.0  | 5.6                 | 5.6  | 1.2       | 1.2  |
| LSD at 5%Level for :              |                |                   |      |                     |      |           |      |
| Compost                           |                | NS                | 0.62 | NS                  | 0.68 | NS        | NS   |
| Antioxidant                       |                | 0.55              | NS   | NS                  | NS   | 0.05      | NS   |
| Compost x Antioxidant             |                | 0.96              | 0.98 | NS                  | NS   | 0.09      | NS   |

Moreover application of antioxidant treatments have auxinic action and also synergistic effect on flowering and fruit trees; therefore they are used instead of auxins and other chemicals for enhancing fruiting of various fruit trees [23, 24].

The effect of compost tea and some antioxidant treatments on length, diameter and L/D ratio of "Le-Conte" pear fruit during 2011 and 2012 seasons are presented in Table (5). Compost applications either as foliar or as soil recorded insignificant differences in the overage length and diameter of fruits in the first season but increased them in the second season as compared to the control treatment. As regard to effect antioxidants effect, ascorbic acid and thiamin application recorded the highest average fruit length and L/D ratio in the first season only as compared with the control. As regard to the interaction between compost tea and tested antioxidants applications, both of foliar and soil applications of compost tea plus different antioxidant treatments had in general no effect on these fruit characters as compared to the control.

The present results agree with the previous results of Fayed [10] working on "Manfalouty" pomegranate.

The fundamental role of antioxidants in regulation of cell division and elongation, protection against oxidative stress, act as co-factor for many enzymes and play a role in signal transduction system and thereby regulation of growth and defense responses had been detected by Smirnoff [25]; Lee and Kader [26] and Pignocchi and Foter [27].

**Fruit TSS and Acidity:** Results in Table (6) show the effect of compost tea and some antioxidant treatments on total soluble solids (TSS%) and acidity (%) of "Le-Conte" pear fruits during 2011 and 2012 seasons. The two applications of compost tea (foliar and soil) increased the fruit TSS content as average compared to control ones. All antioxidants recorded similar effect on TSS as compared between each others. As regard to the interaction between compost tea and different antioxidant applications, foliar or soil application of compost tea plus different antioxidant treatments increased fruit TSS (%) as compared with the untreated control trees without significant differences. Foliar and soil applications of compost tea plus each of the three antioxidants decreased acidity as compared to the control only in the first season with no significant differences.

Table 6: Effect of compost tea and some antioxidant on T.S.S and acidity of Le- Conte fruits during 2011 and 2012 seasons.

| Treatments                        |                | T.S.S % |       | Acidity % |      |
|-----------------------------------|----------------|---------|-------|-----------|------|
|                                   |                | 2011    | 2012  | 2011      | 2012 |
| Application of compost tea        | Antioxidant    |         |       |           |      |
| Foliar application of compost tea | Ascorbic acid  | 15.67   | 16.10 | 0.32      | 0.32 |
|                                   | Thiamin        | 15.67   | 16.10 | 0.32      | 0.32 |
|                                   | Salicylic acid | 15.33   | 15.77 | 0.32      | 0.32 |
|                                   | Without        | 14.67   | 15.73 | 0.32      | 0.32 |
|                                   | Av.            | 15.33   | 15.93 | 0.32      | 0.32 |
| Soil application of compost tea   | Ascorbic acid  | 14.67   | 15.70 | 0.31      | 0.34 |
|                                   | Thiamin        | 14.33   | 15.60 | 0.34      | 0.36 |
|                                   | Salicylic acid | 14.33   | 15.57 | 0.34      | 0.36 |
|                                   | Without        | 14.00   | 15.43 | 0.36      | 0.36 |
|                                   | Av.            | 14.33   | 15.57 | 0.33      | 0.35 |
| Control                           | Ascorbic acid  | 14.00   | 15.43 | 0.36      | 0.36 |
|                                   | Thiamin        | 14.00   | 15.03 | 0.38      | 0.38 |
|                                   | Salicylic acid | 14.00   | 15.00 | 0.38      | 0.38 |
|                                   | Without        | 13.00   | 13.00 | 0.38      | 0.38 |
|                                   | Av.            | 13.75   | 14.62 | 0.37      | 0.37 |
| Average of Antioxidant treatments | Ascorbic acid  | 14.78   | 15.74 | 0.33      | 0.34 |
|                                   | Thiamin        | 14.67   | 15.58 | 0.34      | 0.35 |
|                                   | Salicylic acid | 14.56   | 15.44 | 0.34      | 0.35 |
|                                   | Without        | 13.89   | 14.72 | 0.35      | 0.35 |
| LSD at 5% Level for :             |                |         |       |           |      |
| Compost                           |                | 1.02    | 0.80  | 0.03      | 0.03 |
| Antioxidant                       |                | NS      | 0.66  | NS        | NS   |
| Compost x Antioxidant             |                | 1.86    | 1.15  | 0.05      | 0.05 |

Table 7: Effect of compost tea and some antioxidant treatments on peel pigments of Le- Conte fruits during 2011 and 2012 seasons.

| Treatments                        |                | chlorophyll(a) mg /100g |         | chlorophyll (b)mg / 100 g |        | Carotene mg/100 g |        |
|-----------------------------------|----------------|-------------------------|---------|---------------------------|--------|-------------------|--------|
|                                   |                | 2011                    | 2012    | 2011                      | 2012   | 2011              | 2012   |
| Application of compost tea        | Antioxidant    |                         |         |                           |        |                   |        |
| Foliar application of compost tea | Ascorbic acid  | 0.0397                  | 0.0463  | 0.0830                    | 0.0452 | 0.0281            | 0.0415 |
|                                   | Thiamin        | 0.0378                  | 0.0456  | 0.0761                    | 0.0420 | 0.0252            | 0.0327 |
|                                   | Salicylic acid | 0.0360                  | 0.0447  | 0.0734                    | 0.0411 | 0.0203            | 0.0384 |
|                                   | Without        | 0.0277                  | 0.0436  | 0.0516                    | 0.0387 | 0.0171            | 0.0287 |
|                                   | Av.            | 0.0353                  | 0.0450  | 0.0710                    | 0.0417 | 0.0226            | 0.0353 |
| Soil application of compost tea   | Ascorbic acid  | 0.0253                  | 0.0428  | 0.0409                    | 0.0442 | 0.0249            | 0.0391 |
|                                   | Thiamin        | 0.0225                  | 0.0419  | 0.0357                    | 0.0437 | 0.0248            | 0.0359 |
|                                   | Salicylic acid | 0.0223                  | 0.0410  | 0.0251                    | 0.0407 | 0.0191            | 0.0329 |
|                                   | Without        | 0.0208                  | 0.0408  | 0.0250                    | 0.0335 | 0.0155            | 0.0327 |
|                                   | Av.            | 0.0227                  | 0.04166 | 0.0317                    | 0.0405 | 0.0211            | 0.0351 |
| Control                           | Ascorbic acid  | 0.0207                  | 0.0390  | 0.0346                    | 0.0394 | 0.0244            | 0.0361 |
|                                   | Thiamin        | 0.0196                  | 0.0388  | 0.0296                    | 0.0357 | 0.0239            | 0.0340 |
|                                   | Salicylic acid | 0.0191                  | 0.0375  | 0.0123                    | 0.0363 | 0.0182            | 0.0311 |
|                                   | Without        | 0.0178                  | 0.0355  | 0.0121                    | 0.0337 | 0.0163            | 0.0288 |
|                                   | Av.            | 0.0193                  | 0.0377  | 0.0221                    | 0.0363 | 0.0207            | 0.0325 |
| Average of Antioxidant treatments | Ascorbic acid  | 0.0286                  | 0.0427  | 0.0528                    | 0.0429 | 0.0258            | 0.0389 |
|                                   | Thiamin        | 0.0266                  | 0.0421  | 0.0471                    | 0.0405 | 0.0246            | 0.0342 |
|                                   | Salicylic acid | 0.0258                  | 0.0411  | 0.0369                    | 0.0394 | 0.0192            | 0.0341 |
|                                   | Without        | 0.0221                  | 0.0400  | 0.0296                    | 0.0353 | 0.0163            | 0.0300 |
| LSD at 5%Level at :               |                |                         |         |                           |        |                   |        |
| Compost                           |                | 0.0011                  | 0.0011  | 0.0011                    | NS     | 0.0011            | 0.0011 |
| Antioxidant                       |                | 0.0009                  | 0.0009  | 0.0009                    | NS     | 0.0009            | 0.0009 |
| Compost x Antioxidant             |                | 0.0017                  | 0.0017  | 0.0017                    | NS     | 0.0017            | 0.0017 |

The present results are agreed with the previous results of Abdou [8] on "Le-Conte" pear and Shaaban, *et al.* [11] on "Anna" apple using salicylic acid.

The enhancement effect of antioxidant may be due to their essential roles in signal transduction system, membrane stability and functions, activating transporter enzymes, metabolism and translocation of carbohydrates [25, 28].

**Peel Pigments:** The effect of compost tea and some antioxidant treatments on peel pigments (chlorophyll a and b and carotene) of "Le-Conte" pear fruit during 2011 and 2012 seasons are presented in Table (7). As regard to compost tea applications foliar treatment recorded the highest average increment in peel pigments (chlorophyll a in both seasons and chlorophyll b and carotene in the first season) as compared to soil application and the control. As regard to the effect of tested antioxidants, all antioxidant applications significantly increased the average content of chlorophyll (a) and carotene as compared to the control treatment. As regard to the interaction between compost tea and different antioxidants, foliar application of compost tea plus ascorbic acid gave the highest increment in chlorophyll (a) and carotene contents as compared with untreated trees. As regard to chlorophyll (b) the differences were significant only on the first season.

The current results are in harmony with those of Raskin [3, 4] and Farag [6] and Shaaban *et al.* [11].

Using antioxidants have a wide range of important function such as antioxidant defending, photo protection and regulation of photosynthesis and growth [29].

Finally, the recommendation is using the foliar application of compost tea 5L/tree + ascorbic acid 1000 ppm to improve the leaf NPK content, yield and fruit quality of Le -Cont pear fruits as compared with the soil application and other antioxidants.

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