Middle East Journal of Agriculture Research 3(3): 417-424, 2014
ISSN 2077-4613

# Reducing Mineral Fertilization by Using Organic Fertilization for "Superior seedless" Grapevines Grafted on Freedom Rootstock under Calcareous Soil

**El-Sayed, M.E.A.**

*Viticulture Department, Horticulture Research Institute, Agricultural Research Center, Giza, Egypt.*

## ABSTRACT

The present study was carried out during three successive seasons, 2011, 2012 and 2013 on grape ( *Vitis vinifera* L.) c.v "Superior seedless" grafted on freedom rootstock grown in calcareous soil. Vines were subjected to five fertilizer treatments comprised different level of ammonium sulfate (mineral N source) and compost (organic N source). All vines received the same N requirements 60 kg N /fed, with regarding to the replacement of 25%, 50%, 75% and 100% of the N requirements by organic-N manure (compost) .The results in three seasons indicated that 25% and 0% organic-N treatments increased yield and cluster weight, these treatments also increased weight and size of 100 berries in the second and third seasons. The data of the three experimental seasons showed that cluster length and width were not considerable affected by all treatments except in the second season for cluster length. In the first and third seasons, 25% organic-N recorded the greatest berry length while 100% and 50% organic-N gave the lowest values, respectively. In the second season, 0% and 25% organic-N increased berry diameter. The results in the three seasons showed that there were no significant differences among treatments concerning berry shape index (L/D). Juice% was increased by 100% and 75% organic-N applications in the third season. Data revealed that 75% and 50% organic-N significantly increased T.S.S and T.S.S/acidity ratio in the second and third seasons. The results in three seasons indicated that acidity was not significantly affected by the used treatments. Data showed that all treatments had the same effect concerning bud fertility%. The results in the three seasons showed that 0% organic-N had higher shoot length than the rest treatments. In the first and third seasons, 25% and 0% organic-N treatments remarkably increased leaves number. Leaf fresh weight was increased by 100% and 50% organic-N in the second and third seasons, respectively. It could be noticed in the third season only that leaf dry weight significantly decreased as consequence of decreasing the organic percent. The data in three seasons revealed that nitrogen , phosphorus and potassium were not remarkable affected by all treatments .The best results were observed from the grapevines that received 15 units organic- N + 45 units mineral fertilizer (25% organic-N ) .

***Kew words:*** *Vitis vinifera* L., Mineral, Organic Fertilization, Superior seedless, Grap

## Introduction

Organic fertilization is happen to have a great importance because of the harmful effect and high costs of mineral fertilizers .On the other hand, the low organic matter content of Egyptian soils is due to high temperature and dry climate. Application compost of organic wastes to soil improve its physical properties such as water holding capacity, total porosity , permeability and bulk density (FAO,1977). Besides, compost contains almost all of the macro and micronutrients .Abd El-Galil *et al*. (2003) found that organic fertilizer reduced the recommended dose of mineral N to 75% and lead to the highest vegetative growth . Abd El-Hameed and Rabeea (2005) observed that had effect on the quality of berries were associated with the increasing the organic N fertilizer to 50% . Harhash and Abd El-Nasser (2000) reported that replacing 66.6% nitrogen requirement of Flame seedless grapevines by town refuse or farmyard manure was very useful for reducing nitrate content in berries and in the same time improved fruit physical and chemical properties compared with vine received mineral N only as requirement of nitrogen. The main objective of the present work were to investigate the effect of adding units N/fed by replacement of 25%, 50%, 75% and 100% of recommended requirement of mineral N with organic manure. This replacement led to reduce pollution in the environment, soil and berries of grapes, as well as, reduces the production coasts and improvement properties of the soil returning on the growth vigor and yield of vines.

## Materials and Methods

The present study was carried out during three successive growing seasons, 2011, 2012 and 2013 on 6 year – old grape ( *Vitis vinifera*, L .) c.v " Superior seedless " grafted on freedom rootstock , growing calcareous soil ( Table , 1 ) , at commercial orchard , located at El-Nobaria- Behera , governorate . The vines were planted at 3X1.75 m, the orchard was drip irrigated by using 2x4 L/h emitters per vine. Eight canes with 14 buds were left on each vine at pruning time. Treatments were replicated 3 times with 2 vines for each replicate and arranged in

**Corresponding Author:** El-Sayed, M.E.A., Viticulture Department, Horticulture Research Institute, Agricultural Research Center, Giza, Egypt

*Middle East j. Agric. Res., 3(3): 417-424, 2014*

a randomized complete blocks design. Vines were subjected to five fertilizer treatments, comprised different level of ammonium sulfate (mineral N source) and compost (organic N source). All vines received the same N requirements i.e. 60 kg N/fed, with regarding to the replacement of 25%, 50%, 75% and 100% of the N requirements by organic manure (compost) which its characters presented in Table (2). Treatments were applied as the following:

1- 60 units of mineral N fertilizer ( control or 0% organic-N )
2- 60 units organic N ( 100% organic-N )
3- 45 units organic N + 15 units mineral N fertilizer ( 75% organic-N )
4- 30 units organic N + 30 units mineral N fertilizer ( 50% organic-N )
5- 15 units organic N + 45 units mineral fertilizer ( 25% organic-N )

Organic-N was added at January in 2011, 2012 and 2013. Moreover, ammonium sulfate and potassium sulfate as a source of potassium (90 units) were added as the following:
(a) 15% of N and K fertilizers were applied after bud opening and before flowering
(b) 50% of N and K were supplied after fruit set to veraison
(c) 25 % of K supply was applied between veraison and before harvest
(d) 35% of N fertilization and 10% of K fertilization were added after harvest. Super phosphate calcium as a source of phosphorus (30 units) was added with organic manure (compost). All fertilizers and organic manures were mixed with the 30-cm surface layer of soil under the foliage of vines, about 0.5 m around the vine trunk.

**Table 1:** some physical and chemical characteristics of the experimental soil.

| Mechanical analysis | | Chemical analysis | |
|---|---|---|---|
| WSA % > 0.25 | 14.60 | EC(mhos/cm) | 1.72 |
| WSA % < 0.25 | 85.40 | PH | 8.3 |
| SC | 0.27 | Co3 ( mEq/L ) | - |
| Clay+silt % | 50 | Hco3 | 3.40 |
| Clay% | 27 | Cl | 10.60 |
| Sand% | 50 | So4 | 3.20 |
| Silt% | 23 | Ca+ | 3.20 |
| Texture | Silt clay loam | Mg++ | 4.75 |
| Bulk density(g/cm3) | 1.21 | Na+ | 8.50 |
| Porosity % | 53.65 | K+ | 0.75 |
| SP % | 43.29 | | |
| Hydraulic conductivity (cm/hour) | 2.12 | | |
| Caco3% | 47 | | |
| CaSO4 | 6 | | |
| Organic matter% | 0.613 | | |
| CEC(Cmol/cm) | 13 | | |

**Table 2:** some characteristics of mature compost used in the present study.

| Parameter | Value |
|---|---|
| Square meter weight (kg) | 476 |
| Moisture content (%) | 22 |
| PH | 8.33 |
| EC(ds/m) | 3.6 |
| Total nitrogen (%) | 1.72 |
| Amonium nitrogen (ppm) | 661 |
| Nitrate nitrogen(ppm) | 13 |
| Organic matter (%) | 38.98 |
| Organic carbon (%) | 22.60 |
| Ash (%) | 61.02 |
| C/N ratio | 13.13 : 1 |
| Total phosphours (%) | 1.01 |
| Total potassium (%) | 1.18 |
| Herbs seeds | Not found |
| Nematode | Not found |

*At harvest date (last June):*

(a) bud fertility was determined = $\frac{\text{No. of clusters /vine}}{\text{Total. No of buds}}$ X100 ( Bessis ,1960)

(b) The length and leaf No. of 4 shoots per vine were determined. Moreover, leaf samples consisting of 20 leaves per vine from the mid third portion extension shoots were collected and weighted, then washed with tap water, rinsed twice with distilled water and oven dried at 70 C to a constant weight, then the dry weight determined. The dried materials of the leaf petioles were then ground. Total nitrogen and phosphorus were

determined colorimetrically , Evenhuis (1976 ) and Murphy and Riley, (1962), respectively. Moreover, k was measured using a flame photometer (Chapinan and Pratt, 1961).
(c) In each season, the yield was recorded when the check berries reached to the maturity stage (16 – 17 % T.S.S) on an individual vine basis and was expressed as kg / vine.
(d) A samples of 4 clusters from each replicate of per treatment was taken to determine the physical and chemical properties. Cluster weight, length and width, also, weight and volume of 100 berries, berry length(L) and diameter(D) -average berry shape index(L/D) were calculated. Besides, juice percent was determined =

$$\frac{\text{Juice weight} \times 100.}{\text{Weight of 100 berries}}$$

(e) The percentage of total soluble solids (by hand refractometer), titratable acidity ( A.O.A.C , 1990 ) and T.S.S / acid ratio were determined .
The obtained data was statistically analyzed according to Snedecor and Cochran. (1980).

## Results and Discussion

*Yield and Fruit quality:*

*Yield:*

The data of the experimental seasons (Table 3) revealed that decreasing organic-N increased the vine yield. Moreover, zero and 25% organic-N significantly increased yield as compared with the rest treatments. This result was observed by Morlat (2008) observed that high rates of organic amendments decreased yield of " Cabernet franc " grapevine because of a possible water supply reduction, but more probably a toxic effect of high nitrogen levels. Moreover, Amarante *et al*., (2008), they found that the organic system resulted in lower fruit yield for " Fuji " apple than from the conventional production thus , might be due to lower soil supply of P, K, Mg, N and Ca reduced leaf chlorophyll content, leaf mean area and specific leaf area.

*Average cluster weight:*

The results of the three seasons (Table 3) indicated that decreasing mineral N from 50% to 0% organic-N through out the growing seasons presented similar effect on the cluster weight, whereas, the application 25 or 0% organic-N markedly increased the cluster weight. This effect was observed by Abd El-Hameed and Rabeea (2005), they found that farmyard manure N in 1/4 proportion significantly increased berry weight of Superior seedless grapevine compared with mineral N alone. Besides, Abd El-Galil *et al*. (2003) reported that replacing one fourth of nitrogen requirements for "King Ruby" grapevines by organic N significant increased berry weight compared with using N totally as a mineral source. On the other hand, Amarante *et al*. (2008) observed that fruit from organic orchard had lower average weight than conventional system.

**Table 3:** Effect of compost and mineral nitrogen fertilizers on yield and cluster weight during 2011, 2012 and 2013 seasons.

| Season / Treatments | Yield (kg) 2011 | Yield (kg) 2012 | Yield (kg) 2013 | Cluster weight (g) 2011 | Cluster weight (g) 2012 | Cluster weight (g) 2013 |
|---|---|---|---|---|---|---|
| 100% organic-N | 7.15 | 6.46 | 8.45 | 551.76 | 313.71 | 520.22 |
| 75% organic-N | 8.01 | 5.86 | 8.75 | 538.23 | 445.23 | 574.23 |
| 50% organic-N | 6.55 | 7.58 | 9.35 | 478.69 | 454.97 | 511.23 |
| 25% organic-N | 14.31 | 12.93 | 14.95 | 632.11 | 652.82 | 706.12 |
| 0% organic-N | 15.58 | 13.91 | 14.60 | 715.80 | 569.58 | 723.52 |
| L.S.D.05 | 5.65 | 2.23 | 2.42 | 129.18 | 201.14 | 73.04 |

*Cluster length and width:*

The data of both 2011 and 2013 seasons (Table 4), cluster length was not affected with organic or mineral-N amount. Moreover, the vines fertilized with 25% organic-N presented the highest length. In 2012 season, the data concerning the cluster length, indicated that, 25% organic-N treatment had remarkably effect comparing to 100%, 75% and 0% organic-N treatments. Data of the three experimental seasons indicated that cluster width was not considerable affected by all treatments. The 0% or 100% organic-N had the highest and lowest cluster width values, respectively. Similar results were observed by Mostafa *et al*., (2008) who reported that all organic sources gave no clear increment in the clusters length and width of grapevines. Moreover, Abd El-Galil *et al*., (2003) , they also observed that replacing one fourth or half of N requirements for King Ruby grapevines by

*Middle East j. Agric. Res., 3(3): 417-424, 2014*

organic N gave slight increase and non significant increments of both cluster length and width above that control of " King Ruby " grapevines .

**Table 4:** Effect of compost and mineral nitrogen fertilizers on cluster length and width during 2011, 2012 and 2013 seasons.

| Season / Treatments | Cluster length 2011 (cm) | Cluster length 2012 (cm) | Cluster length 2013 (cm) | Cluster width 2011 (cm) | Cluster width 2012 (cm) | Cluster width 2013 (cm) |
|---|---|---|---|---|---|---|
| 100% organic-N | 21.44 | 17.40 | 20.49 | 12.66 | 10.26 | 11.92 |
| 75% organic-N | 20.33 | 18.59 | 21.14 | 12.88 | 10.68 | 12.43 |
| 50% organic-N | 20.33 | 21.88 | 19.74 | 13.33 | 12.88 | 12.98 |
| 25% organic-N | 22.33 | 22.66 | 22.78 | 13.77 | 14.44 | 13.32 |
| 0% organic-N | 21.77 | 20.55 | 22.34 | 13.99 | 14.55 | 14.21 |
| L.S.D.05 | N.S | 1.92 | N.S | N.S | N.S | N.S |

*Weight and size of 100 berries:*

The data presented in Table (5) indicated that there were not significant differences among tested treatments concerning weight and size of 100 berries in the first season . In the second season, it was found that, 25% organic-N had marked effect than 100, 75% organic-N treatments, while in the third year, 25% organic-N had more effect than all treatments except 0% organic-N treatment for the size of 100 berries. The results were supported by Abd El-Hameed and Rabee (2005) on Superior grapevine, Abd El-Galil *et al*., (2003) on King Ruby cultivar and Darwish *et al*. (1996) on Red roomi grapevine. Besides , Mortved *et al*. ( 1991 ) and Khattari and Shatat ( 1993 ) , they found that increasing the values of fruit physical properties as results of organic manure may be due to its effect in improving nutrients uptake which enhanced the formation of carbohydrates as well as cell enlargement . On the other hand, Reeve *et al*., (2005) found that berry weight showed no difference under organic and conventional agriculture. Peck *et al*., (2006) observed that no differences existed between organic and convention systems in apple fruit weight.

**Table 5:** Effect of compost and mineral nitrogen fertilizers on weight and size of 100 berries during 2011, 2012 and 2013 seasons.

| Season / Treatments | Weight of 100 berries (g) 2011 | Weight of 100 berries (g) 2012 | Weight of 100 berries (g) 2013 | Size of 100 berries (cm3) 2011 | Size of 100 berries (cm3) 2012 | Size of 100 berries (cm3) 2013 |
|---|---|---|---|---|---|---|
| 100% organic-N | 457.51 | 369.59 | 410.22 | 426.67 | 346.67 | 394.23 |
| 75% organic-N | 530.36 | 419.71 | 433.14 | 460.00 | 390.00 | 413.19 |
| 50% organic-N | 476.53 | 461.10 | 472.33 | 446.67 | 433.33 | 427.47 |
| 25% organic-N | 526.99 | 515.39 | 507.12 | 496.67 | 473.33 | 482.12 |
| 0% organic-N | 480.54 | 508.75 | 502.17 | 480.00 | 470.00 | 467.17 |
| L.S.D.05 | N.S | 75.60 | 14.69 | N.S | 76.09 | 12.95 |

*Berry length and diameter:*

In the first and third seasons, 25% organic-N recorded the greatest berry length value while 100% and 50% organic-N gave the lowest berry length values, respectively. In the second season , berry length was not significantly affected by all treatments ( Table 6) .In respect to berry diameter , there were not significant differences among treatments tested in the first and third seasons whereas , in the second season 0% and 25% organic-N had significantly higher berry diameter than 50% organic ( Table 6 ) .These results partially were supported by Abd El-Hameed and Rabeea ( 2005 ) , Abd-Galil *et al*., ( 2003 ) and Darwish *et al*., (1996 ) on grapevines .

**Table 6:** Effect of compost and mineral nitrogen fertilizers on berry length and diameter during 2011, 2012 and 2013 seasons.

| Season / Treatments | Berry length (mm) 2011 | Berry length (mm) 2012 | Berry length (mm) 2013 | Berry diameter (mm) 2011 | Berry diameter (mm) 2012 | Berry diameter (mm) 2013 |
|---|---|---|---|---|---|---|
| 100% organic-N | 18.29 | 21.48 | 20.42 | 16.03 | 18.16 | 17.97 |
| 75% organic-N | 19.99 | 21.50 | 20.74 | 16.99 | 18.14 | 17.92 |
| 50% organic-N | 21.14 | 20.61 | 20.14 | 18.26 | 17.22 | 18.02 |
| 25% organic-N | 22.18 | 21.07 | 21.17 | 18.77 | 18.57 | 18.37 |
| 0% organic-N | 21.08 | 21.70 | 21.13 | 17.89 | 18.91 | 18.44 |
| L.S.D.05 | 2.31 | N.S | 0.13 | N.S | 1.00 | N.S |

*Berry shape index (L/D) and juice%:*

The results in three seasons showed that berry shape index ( L/D) was not considerable affected by treatments ( Table 7 ) . Data also indicated that juice% was not significantly affected by all treatments in the first and second seasons while 100% organic and 75% organic increased juice% as compared with the other treatments in the third season ( Table 8 ) .

**Table 7:** Effect of compost and mineral nitrogen fertilizers on L/D ratio during 2011, 2012 and 2013 seasons.

| | L/D ratio 2011 | L/D ratio 2012 | L/D ratio 2013 |
|---|---|---|---|
| 100% organic-N | 1.13 | 1.17 | 1.16 |
| 75% organic-N | 1.17 | 1.18 | 1.17 |
| 50% organic-N | 1.15 | 1.19 | 1.15 |
| 25% organic-N | 1.17 | 1.13 | 1.14 |
| 0% organic-N | 1.17 | 1.14 | 1.13 |
| L.S.D.05 | N.S | N.S | N.S |

Table 8: Effect of compost and mineral nitrogen fertilizers on juice % during 2011, 2012 and 2013 seasons.

| Season / Treatments | Juice % 2011 | Juice % 2012 | Juice % 2013 |
|---|---|---|---|
| 100% organic-N | 74.29 | 77.50 | 82.02 |
| 75% organic-N | 78.08 | 72.60 | 80.32 |
| 50% organic-N | 80.81 | 81.14 | 76.27 |
| 25% organic-N | 79.38 | 81.41 | 74.33 |
| 0% organic-N | 80.29 | 81.74 | 79.89 |
| L.S.D.05 | N.S | N.S | 3.42 |

*Juice acidity:*

The data in three seasons indicated that acidity was not significantly affected by the used treatments (Table 9). This effect was observed by Kling (1995) reported that acidity of Concord cultivar showed no major differences between the juices from the conventional and the organic systems. Amodio *et al*. (2007), they found that organic acids of Kiwifruits were not affected by organic and conventional systems.

*Total soluble solids (TSS):*

In the first season, there were no significant differences among the tested treatments concerning T.S.S. The obtained results in 2012 season showed that , 75% organic-N had significantly effect than 25% and 0% organic-N while 100 , 25 and 0% organic-N the same effect . In the 2013 season, 75% organic-N treatment had markedly effect than all treatments which the differences among them were significant (Table, 9). The same line was found by Kling (1995) found that there were no significant differences between the conventional and the organic production concerning T.S.S of Concord grapes. Amodio *et al*. (2007) observed that sugars of Kiwifruits were not affected by organic and conventional systems. On the other hand, Harhash and Abd El-Nasser (2000) found that replacing 2/3 N requirements of Flame seedless grapevines by farmyard manure was very useful on increasing SSC compared with vine received mineral N only of nitrogen. Besides, Abd El-Galil *et al*. (2003) found that replacing one fourth or half of nitrogen requirements for vine by organic-N gave a significant increase of SSC% compared with using N totally as a mineral source. The effect of organic nitrogen fertilizer acts for controlling uptake of nitrogen by the vines for a long period and advancing their maturity could give a good explanation for the improving effect of organic manure on fruit quality. Abd El-Hady *et al.* (2003) concluded that the positive of the organic materials on berry quality may be result of accumulating more carbohydrates and enhancing fruit ripening.

**Table 9:** Effect of compost and mineral nitrogen fertilizers on T.S.S and acidity during 2011, 2012 and 2013 seasons.

| Season / Treatments | T.S.S % 2011 | T.S.S % 2012 | T.S.S % 2013 | Acidity % 2011 | Acidity % 2012 | Acidity % 2013 |
|---|---|---|---|---|---|---|
| 100 % organic-N | 16.96 | 16.69 | 16.81 | 0.29 | 0.29 | 0.30 |
| 75% organic-N | 17.93 | 17.69 | 17.82 | 0.29 | 0.32 | 0.30 |
| 50% organic-N | 16.68 | 17.34 | 17.23 | 0.29 | 0.28 | 0.29 |
| 25% organic-N | 17.46 | 16.53 | 17.19 | 0.29 | 0.32 | 0.30 |
| 0% organic-N | 17.97 | 15.64 | 16.77 | 0.29 | 0.29 | 0.31 |
| L.S.D.05 | N.S | 1.20 | 0.02 | N.S | N.S | N.S |

*T.S.S/Acidity ratio:*

In the first season, all treatments had the same effect on T.S.S/acidity ratio. In the second and third seasons, 50% and 75 % organic-N gave the highest T.S.S/acidity while 25% and zero organic-N% recorded the lowest values, respectively (Table 10). These findings seem to be in agreement with Kling ( 1995 ) on " Concord " grapevines , Amodio *et al*. ( 2007) on Kiwifruits , Harhash and Abd El-Nasser (2000) on "Flame seedless" grapevine , Abd El-Galil *et al*. (2003) on King Ruby cultivar and Abd El-Hameed and Rabeea ( 2005 ) on grapevine.

**Table 10:** Effect of compost and mineral nitrogen fertilizers on T.S.S/acidity ratio during 2011, 2012 and 2013 seasons.

| Season / Treatments | T.S.S/ acidity ratio 2011 | T.S.S/Acidity ratio 2012 | T.S.S/acidity ratio 2013 |
|---|---|---|---|
| 100% organic-N | 58.26 | 56.24 | 56.06 |
| 75% organic-N | 62.96 | 54.77 | 59.44 |
| 50% organic-N | 57.72 | 61.98 | 58.66 |
| 25% organic-N | 60.51 | 50.69 | 57.47 |
| 0% organic-N | 62.04 | 52.88 | 54.12 |
| L.S.D.05 | N.S | 4.58 | 3.52 |

*Bud fertility %:*

Data in (Table11) revealed that bud fertility was not significantly affected by all used treatments in the three experimental seasons. The same trend was found by Sefan (2009) treated "Ruby" grapevine with some organic wastes.

**Table 11:** Effect of compost and mineral nitrogen fertilizers on bud fertility % during 2011, 2012 and 2013 seasons.

| Season / Treatments | Bud fertility % 2011 | Bud fertility % 2012 | Bud fertility % 2013 |
|---|---|---|---|
| 100 % organic-N | 31.2 | 29.2 | 30.3 |
| 75 % organic-N | 29.6 | 27.8 | 31.6 |
| 50 % organic-N | 34.8 | 30.00 | 27.2 |
| 25 % organic-N | 32.1 | 26.1 | 29.8 |
| 0 % organic-N | 34.05 | 28.7 | 32.9 |
| L.S.D.05 | N.S | N.S | N.S |

*Shoot length:*

The results in the three seasons showed that 0% organic-N had considerable higher shoot length than the rest treatments except 25% organic-N treatment in the 2011 season (Table 12). Moreover, the lowest shoot length was 51 cm, 109.58 cm and 74.14 cm obtained by 75%, 50% and 100% organic-N in the 2011, 2012 and 2013 season, respectively. Similar results were observed by Abd El-Razek (2011), Delgado *et al*. (2004) and Ruhi *et al*. (1992); they reported that increasing N mineral enhanced vegetative growth of grapevines due to improving photosynthesis.

**Table 12:** Effect of compost and mineral nitrogen fertilizers on shoot length (Cm) and leaves number during 2011, 2012 and 2013 seasons.

| Season / Treatments | Shoot length 2011 | Shoot length 2012 | Shoot length 2013 | Leaves number 2011 | Leaves number 2012 | Leaves number 2013 |
|---|---|---|---|---|---|---|
| 100%organic-N | 55.00 | 111.92 | 74.14 | 21.83 | 35.58 | 26.04 |
| 75% organic-N | 51.00 | 141.17 | 83.10 | 21.58 | 43.00 | 31.36 |
| 50% organic-N | 78.75 | 109.58 | 90.66 | 32.08 | 39.91 | 36.32 |
| 25% organic-N | 122.25 | 137.47 | 122.99 | 49.41 | 48.61 | 47.73 |
| 0% organic-N | 129.33 | 177.67 | 143.22 | 48.75 | 46.99 | 46.18 |
| L.S.D.05 | 28.26 | 31.89 | 12.67 | 10.83 | N.S | 7.77 |

*Leaves number:*

In the first and third seasons, 25% organic and zero organic-N treatments remarkably increased leaves number than the other treatments. In the second season, all treatments presented the similar effect on the leaves number (Table 13). These data were supported by Abd El-Hamed and Rabeea (2005) and Abd –Galil *et al*. (2003) reported that replacing one fourth or half of nitrogen requirements for vine by organic N significant increased vegetative growth. The increase in plant growth parameters due to organic manures application could be attributed to its positive effect on solubilizing some soil elements making them more readily available for the growth and the associated soil microorganism activity as well as releasing its contents of the available nutrients ( Alexander , 1977 ) . Meanwhile, Roussos and Gasparatos (2009) reported that the organic and conventional apple orchard resulted in similar new seasons shoot growth.

*Leaves fresh and dry weight:*

In the first season (Table, 13), all treatments had the same effect on leaf fresh weight, whereas in the second season, 100% organic-N had markedly effect than 25 and 0% organic-N. In the third season, 50% organic-N significantly increased leaf fresh weight than 75, 25 and 0% organic-N treatments, however. It could be noticed in the third season only that leaf dry weight significantly decreased as consequence of decreasing the organic percent. These findings were supported by El-Sheik *et al*. (2006) reported that organic amendments led to increase in leaf fresh and dry weight of "Thompson seedless" grapevines.

**Table 13:** Effect of compost and mineral nitrogen fertilizers on leaves fresh and dry weight during 2011, 2012 and 2013 seasons.

| Season / Treatments | Leaves fresh weight (g)2011 | Leaves fresh weight (g)2012 | Leaves fresh weight (g)2013 | Leaves dry weight(g) 2011 | Leaves dry weight(g) 2012 | Leaves dry weight(g) 2013 |
|---|---|---|---|---|---|---|
| 100% organic-N | 44.66 | 44.66 | 45.23 | 18.46 | 14.60 | 17.44 |
| 75% organic-N | 45.84 | 42.57 | 43.12 | 17.26 | 14.13 | 16.22 |
| 50% organic-N | 54.08 | 39.36 | 45.44 | 18.66 | 13.86 | 15.23 |
| 25% organic-N | 60.66 | 29.78 | 44.63 | 20.26 | 12.26 | 15.74 |
| 0% organic-N | 52.71 | 32.82 | 42.84 | 17.80 | 12.60 | 14.94 |
| L.S.D.05 | N.S | 9.14 | 0.39 | N.S | N.S | 0.23 |

*Leaf mineral content:*

The data in three seasons indicated that nitrogen; phosphorus and potassium were not remarkable affected by all treatments (Table 14). The results are in accordance with those reported by Saleh *et al.* (2006) found that phosphorus content of Thompson seedless grapevine was not affected under organic and mineral systems. Abou-Taleb and Safia (2004) phosphorus of pecan did not significantly responded to replacement of recommended requirements of mineral N with organic manure. Peck *et al*. (2006) found that leaf nitrogen, phosphorus and potassium were not significantly affected by organic and conventional apples.

**Table 14:** Effect of compost and mineral nitrogen fertilizers on NPK leaf petioles during 2011, 2012 and 2013 seasons.

| Season / Treatments | N% 2011 | N% 2012 | N% 2013 | P% 2011 | P% 2012 | P% 2013 | K% 2011 | K% 2012 | K% 2013 |
|---|---|---|---|---|---|---|---|---|---|
| 100% organic-N | 1.86 | 2.07 | 1.93 | 0.31 | 0.37 | 0.32 | 2.37 | 2.59 | 2.34 |
| 75% organic-N | 2.16 | 2.05 | 1.97 | 0.35 | 0.41 | 0.34 | 2.96 | 1.92 | 2.48 |
| 50% organic-N | 2.06 | 2.23 | 2.03 | 0.40 | 0.32 | 0.36 | 2.64 | 2.92 | 2.53 |
| 25% organic-N | 1.76 | 2.18 | 1.92 | 0.34 | 0.42 | 0.33 | 2.92 | 2.09 | 2.39 |
| 0% organic-N | 2.20 | 1.89 | 1.98 | 0.38 | 0.38 | 0.34 | 2.87 | 2.94 | 2.64 |
| L.S.D.05 | N.S | N.S | N.S | N.S | N.S | N.S | N.S | N.S | N.S |

## References

A.O.A.C., 1990. Association of Official Analytical Chemists Edited by S. Williams, Association of Official, Analytical Chemists.

Abd El-Galil, H.A., M.M. Elsoky and M.M. El-Wasfy, 2003. Effect of some cultivar practices on King Ruby grapevine production under Assiut conditions. A. Effect of organic manure and yeast application on growth and nutrients status as well as yield and berry quality. Assuit J. Agri . Sci., 34(6): 173-192.

Abd El-Hady, A.M., N.A. Aly and M.M. El–Mogy, 2003. Effect of some soil conditioners on counteracting the adverse effects of salinity on growth and fruiting of Flame seedless vines. Minia . J . Agri . Res. Develop., 23(4): 699- 726.

Abd El-Hameed, H.M. and M. Rabeea, 2005. Adusting the best proportion of mineral, organic and biofertilizers for Superior grapevines. Minia . J. Agri. Res. Develop, 25(5): 863-882.

Abd El-Razek, E., D. Treutter, M.M.S. Saleh, M. El-Shammaa, A.A. Fouad and N. Abdel-Hamid, 2011. Effect of nitrogen and potassium fertilization on productivity and fruit quality of "Crimson seedless" grape. Agric. Biol . J. N.Am, 2(2): 330-340 .

Abou-Taleb and A. Safia, 2004. Effect of cattle manure and reducing mineral fertilizer on growth, fruit quality and nutrient content of pecan trees. Annals Agric. Sci., Moshtohor, 42(3): 1197-1214.

Alexander, M., 1977 . Introduction to soil microbiology. 2 nd ed., Johan Wiley and Sons In., New York, pp: 467.

Amarante, C.V., C.A. Steffens, A.L. Mafra, J.A. Albuquerque, 2008. Yield and fruit quality of apple from conventional and organic production systems. Pesq . Agropec . Bras, 43(3).

Amodio, M.L., G. Colellil, J.K. Hasey and A.A. Kader, 2007. A comparative study of composition and postharvest performance of organically and conventionally grown Kiwifruits. Journal of the Science of Food and Agriculture, 87(7): 1228-1236 .

Bessis, R., 1960. Sur different Models Expression Quantitative Dela fertilite chez la vigne Aca, 828-882.

Chapman, H.D. and P.F. pratt, 1961. Methods of analysis for soil, plants and water. Unvi . Calf.Div.Agri .

Darwish, O.H., L.F. Hannaand and M.A. Maatouk, 1996. Availability of phosphorus as rock phosphate for Roomy Red grapevines by some materials. For Horticulture. Crops, El-minia, Egypt .

Delgado, R., P. Martin, M. Del Alamo and M. Gonzalez, 2004. Changes in phenolic composition of grape berries during ripening in relation to vineyard nitrogen and potassium fertilization rates. J. Sci. Food and Agric., 84: 623-630.

El-Sheikh, M.H., E.Z. Abd El-Motty and S.A.A. Hasabo, 2006. Effect of Two organic Amendments, elemental sulphur, bionema and carbofuran soil application to control root-knot nematode on growth and productivity of Thompson seedless grapes. American- Eurasian J . Agri. And Environ. Sci., 1(3): 191-197.

Evenhuis, B., 1976. Simplified methods for foliar analysis parts I-VII. Internal report Royal Tropical Inst. Amsterdam.

FAO, 1977. Recycling of organic wastes in agriculture. FAO Soil Bull., 40: 1-28.

Harhash, M.M. and G. Abd El-Nasser, 2000. Effect of organic manures in combination, yield, fruit quality, leaf water contents and nutritional status of Flame seedless grapevines. J. Agric. Sci. Mansoura Univ., 25(95); 2819- 2837.

Kattari, S. and Shatat, 1993. Yield and quality of ( *Vitis vinifera* , L .) cv . Salti as affected by nitrogen rates and time of application. Dirasat, Series B, Pure and applied Sci., 20(1):72-79 ( . F. Hort. Abst., 63 (12), 9082.

Kling, T.H., 1995. Summary of effects of organic and conventional grape production practices on juice and wine composition. Organic Grape and Wine Production Symposium, 89-102.

Morlat, R., 2008. Long-term additions of organic amendments in a Loire valley vineyard on a calcareous sandy soil. II Effects on root system, growth, grape yield, and foliar nutrient status of a Cabernet franc vine. Am. J. Enol . Vitic, 59(4): 364-374.

Mortvedt, J. J; F. R. Xox; L. M. Shuman and R. M. Welch (1991). Micronutrients in Agriculture. P 440, Soil Sci. Soc. Amer. Inc., Madison Wisconsin, USA.

Mostafa, M.F.M., A. Hegazi, M.M. El –Mogy and B.E.A. Belal, 2008. Effect of some organic fertilizers from different source on yield and quality of Thompson seedless grapevines *( Vitis vinifera* , L.) . J. Agric. Sci. Mansoura Univ., 33(10): 7421- 7435.

Murphy, J. and J.P. Riley, 1962. A modified single solution method for the determination of phosphate in natural water . Anal. Chem . Acta., 27: 31-36.

Peck, G.M., P.K. Andrews, J.P . Reganold and J.K. Fellman, 2006. Apple orchard productivity and fruit quality under organic, conventional, integrated management. HortScience, 41(1) : 99-107 .

Reeve, R.J., L.C. Boggs, J.P. Reganold, A.L. York, G.M. Gourty and L.P. Mc closkey, 2005. Soil and winegrape quality in biodynamically and organically managed vineyards. Am. J . Enol . Vitic, 56(4): 367-376.

Roussos, P.A. and D. Gasparatos, 2009. Apple tree growth and overall fruit quality under organic and conventional orchard management. Scientia Horticulturae, 123(2): 247-252.

Ruhi, E.H., A.P. Fuda and M.T. Treeby, 1992. Effect of potassium, magansium and nitrogen supply on grape juice composition of Riesling, Chardonny and Caberenet Souvignon vines. Australian. J. Exp. Agric., 32: 645- 649.

Saleh, M.M.S., S. El-Ashry and A.M. Gomaa, 2006. Performance of Thompson seedless grapevine as influenced by organic fertilizer, humic acid and biofertilizers under sandy soil conditions. Research Journal of Agricultural and Biological Sciences, 2(6): 467-471 .

Snedecor, G.W. and W.G. Cochran, 1980. Statistical Methods. Oixand J.B.Pud . Com. 6 th Edition.

Tourky, M.N., S.S. El-Shahat and M.H. Rizk, 1995. Effect of Dormex on fruit set, quality and storage life of Thompson seedless grapes. J. Agric., Mansoura Univ., 20(12): 5139-5151.