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Impact of Organic, Bio Fertilization and Humic Acid on Growth and Fruiting of Flame Seedless Grapevines under Sandy Soil Conditions

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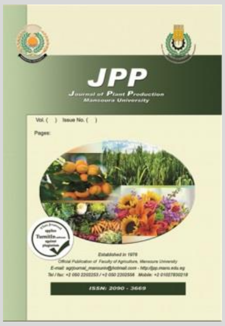

ABSTRACT

The present investigation was carried out during two successive seasons 2019 and 2020 on Flame seedless grapes cultivar grown in sandy soil at private farm, Naga Hamady, Qena Governorate, Egypt. Eight treatments of mineral N, humic acid, organic and biofertilization applied to study the effect of them on vegetative growth, soil nutrient status, and fruiting of Flame seedless grapevines. The experimental vines were arranged in a complete randomized design with eight treatments and three replications two vine per each. The obtained results could be summarized as follow: Using the recommended dose of nitrogen (RDN) via 25 to 50% mineral plus 25 to 50% Humic acid (HA) or compost and bio-mix significantly increased, leaf area, pruning wood weight, and leaf total chlorophyll as well as leaf nutrient composition compared to use RDN via mineral N fertilizer alone. All combined fertilization treatments significantly increased the yield and improved the cluster and berry traits compared to use RDN via mineral source only. The results of this investigation indicated that, most trace element and soil physical and chemical properties were increased with increasing the level of organic, bio fertilization and humic acid in studied soil. Also, it could be concluded that fertilized vines with 25 to 50% of nitrogen requirements plus HA or compost and bio-mix improved the vegetative growth and nutritional status, as well as, yield, cluster attributes and berry quality of Flame seedless grapevines under this experiment circumstances.

Keywords: Mineral nitrogen, humic acid, organic, bio fertilization soil characterization, grapes, sandy soil.

INTRODUCTION

Grapes (*Vitis vinifera L.*) are considered the first major fruit crop in its production all over the world, for being of an excellent flavor, nice taste and high nutritional value. In Egypt grapes rank third among fruit crops, while citrus being the first. The total planted area attained about 221709 Fed with an average of 1626259 tons. Flame seedless is one of the most important cultivars cultivated in the Egyptian vineyards for both exportation and local market, (FAOstat., 2019).

Fertilization is one of the important management for increasing the yield. The optimum nitrogen rate applied to table grapes usually ranges between 40 to 100 g/vine/year, depending on the soil type, climate and cultivar (Khalil *et al*., 1989). The efficiency of nitrogen fertilizer under field conditions and flood irrigation rarely exceeds 50% (Sahrawat., 1979). Use of the chemical fertilizers to overcome the low fertility of soils become more expensive item for orchard management and causes environmental pollution.Several studies were conducted to produce organic fruit through using organic and bio-fertilizers, and gradually reduce the use of mineral fertilizers and artificial growth regulators (Morlat, 2008 and Calleja-Cervantes *et al*., 2015).

The addition of humic substances increases the organic matter (OM) content of the soil without going for any humification process of (OM) to happen because it is already present as humified material (Yang *et al*., 2019). Organic and biofertilizers are very useful and effective on soil compared to use chemicals (De-Ell and Prange., 1993), more safe in production process for either applicators or consumers, also considered as an important source of macro- and micro-nutrients and to improve the trunk quality (Mba., 1994). In sandy and sandy loam soils, the organic fertilization is the best source of nutrients. It also increases number and activity of microorganisms in the soil and helps to prevent breakdown of soil structure leaving good structure in the soil associated with greater water holding capacity (Nijjar, 1985; Miller *et al*., 1990; Darwish *et al*., 1995; Abdel-Nasser and Harhash., 2000; Biala, 2000; El-Salhy *et al*., 2006 and Fuentes *et al*., 2008). Compost is widely used in agriculture and horticulture, and it has been recently trialled for grapevine, the use of compost favours an increase in soil porosity, its structural stability and water retention capacity, reducing erosion (Pinamonti, 1998; Korboulewsky *et al*., 2004 and Powell *et al*., 2007).

Humic substances are the blackish- or brownish-colored organic compositions with large molecular weights and complex structures constructed by the decomposition of plant or animal remain (Lee *et al*., 2004). It has also been applied as soil amendments to ameliorate chemical and physical attributes (Suh *et al*., 2014). Humic substances include humic acid, humin, and fulvic acid depending on its solvability at various pH (Lee *et al*., 2004). In this respect, many researchers emphasized the importance of theaforementioned practices to increase the growth and fruiting of grapevines (Abdel-Monem., 2008; Ferrara and Brunti.,

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2010; El-Sabagh *et al*., 2011; Abdelaal *et al*., 2013; Abd El-Kareem 2014; Mohamadiniea *et al*., 2015; Ibrahim and ali 2016; El-Sally *et al*., 2017; Akin., 2018 and Popescu and Popescu 2018). Therefore, the objective of this investigation was to study the possibility of using bio-fertilization partially instead of completed mineral fertilizers on growth and fruiting of Flame seedless grapevines.

This study aimed to recognize the benefit of application with different sources of nitrogen fertilization and humic acid on trace elements and some soil physical and chemical properties, as well as growth and fruiting of Flame seedless grapevines cultivar.

MATERIALS AND METHODS

The present work was conducted through two successive seasons of 2019 and 2020 on Flame seedless grapevines. The vines were grown at private farm, Naga Hamady, Qena Governorate, Egypt. Soil of the vineyard is sandy (under drip irrigation system) and its some physical and chemical properties were determined according to Wilde *et al*., (1985) and are present in Table (1). The vines were 10 years old at the starting of this experiment and spaced at 1.5x3 meters apart. The vines trained according to the double cordon system and supported with Gable shape. Pruning was carried out at the second week of December by leaving 14 fruiting spurs with 3 buds each spur plus four replacement spurs with 2 buds each. Forty-eight healthy vines, with no visual nutrient deficiency symptoms and at almost uniform in their vigor were chosen and divided into eight different treatments including the control.

The experimental vines were arranged in a complete randomized block design with three replications per treatment two vines in each.

Thus, the treatments were as follow:

1- Control (100% mineral N, 240g, NH_4NO_3/vine).
2- 75% mineral N +25% Humic acid (HA) 5g/vine).
3- 50% mineral N + 50% HA (10g/vine).
4- 50% mineral N + 50% Compost 2% (2 kg/vine).
5- 50% mineral N + 25% Compost (1kg) + 25% Bio-mix (2.5g/vine).
6- 25% mineral N + 75% Humic acid (15g/vine).
7- 25% mineral N + 25% Compost (1kg) + 50% Bio-mix (5g/vine).
8- 30% mineral N + 35% Humic acid(6.6g/vine) + 35% Bio-mix (3.5g/vine).

Each treatment had the recommended N level (80g N/vine/year). Amomum nitrate (33.5% N) as a mineral source was applied at three times: growth start, immediately after berry set and at two months later. The organic fertilizer (compost 2%N) as added once at first week of March. The HA and bio-mix were applied twice at first March and first April. Bio-mix is bio fertilizer that contain a mixed of (photosynthetic and lactic acid bacteria as well as actinomyces, yeast and fungi as well as humic and fulvic acids). Normal agricultural and horticultural practices used in vineyard (except fertilization) were carried out.

Measurements:

1. Soil analytical Methods.

Subsurface soil samples (0-60 cm) were taken from each plot in both seasons. The samples were bulked and air-dried for analysis.

Particles-size distribution: Particles-size distribution of the soils was performed using the pipette method that is described by Jackson (1973). Organic matter: Organic matter content of the soil samples was determined using the dichromate oxidation method that is described by Wakley and Black (Jackson, 1973). Soil pH was determined in 1:2.5 water suspension of soil to water using a glass electrode as reported by McLean (1982).

Table 1. Some soil physical and chemical properties of the experiment soil.

Property Soil property	Sandy soil (0-60 cm)
Sand (%)	88.0
Silt (%)	4.0
Clay (%)	8.0
Texture	sandy
ECe (mS/cm)	0.382
pH (1:1 suspension)	8.1
Organ meter(%)	0.064
Total N (%)	0.023
Total P (mg/kg)	0.361
Available K(meq/100g)	0.26
Available Ca (meq/100g)	4.7
Available Mg (meq/100g)	1.11
CaCo3 (%)	0.50
Available Na (meq/100g)	0.37
Cu (mg/kg)	2.26
Fe (mg/kg)	4.0
Mn (mg/kg)	8.12
Zn (mg/kg)	4.97

Available N was determined by using extracting method by K_2SO_4 (1%) and Devard's alloy (Jackson, 1973). The soil available P was extracted using 0.5M NaHCO3 at pH 8.5 as described by Olsen *et al*., (1954). Available potassium was extracted by ammonium acetate method and measured by flame photometry (Jackson, 1973). Trace elements (Fe, Mn, Cu, Zn) were analyzed using the Perkin Elmer's Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES).

2. Vegetative growth

Leaf area (cm^2): At full bloom a sample of twenty mature leaves replicated three times (3 trees) was abscised from the top of the growing shoot (6th or 7th leaf) to measure the average leaf area using the following equation: Leaf area (cm^2) = 0.587 (L×W), where L = length of leaf blade and W = width of leaf blade according to (Montero *et al*., 2000) and the average was expressed as (cm2).

Weight of pruning wood: was recorded immediately after pruning (December , 15) and was expressed as kg/vine.

Leaf chlorophyll content: was estimated by using chlorophyll meter (SPAD 502 plus) using four leaves/replication from the fourth terminal expended leaf of the shoot (Yadava, U.L., 1986).

leaf mineral contents: Samples of 30 leaves for each replication were collected from the first full mature leaves from the top of shoots in mid July and leaf petioles were separated from the blades. The petioles were washed with tap water, distilled water, air-dried, ovendried at 70°C to constant weight, then ground in a stainless steel mill. Wet digestion was done by using concentrated sulphoric acid and hydrogen peroxide for overnight. Percentages of N, P and K (on dry weight basis) were determined in the digestion according Wilde *et al*. (1985).

2- Yield components

At harvest time (when TSS of berry juice in the check treatment reached 14-15% brix), the clusters were harvested, weighed and yield/vine (kg) was recorded. Two clusters were taken at random from yield of each vine and the following characteristics were determined. Cluster weight (g) and berry weight (g), then cluster compactness coefficient according to Winkler *et al*. (1974).

In addition berry quality in terms of berry weight, TSS, total titratable acidity and reducing sugars % according to AOAC. (1985). Total anthocyanin content of juice was determined according to the method described by Rabino and Mancinelli. (1986). Data were tabulated and statistically analyzed according to (Gomez and Gomez., 1984 and Snedecor and Cochran., 1990). Differences between means were compared by Duncan's Multiple Range test at 5% level of probability (Duncan., 1955).

RESULTS AND DISCUSSION

Results

1. Effect of different sources of nitrogen fertilization and humic acid application on trace elements and some soil physical and chemical properties.

The effect of the investigated nitrogen fertilization and humic acid application on some soil physical and chemical properties were shown in Table 2. The results indicated that mild increase in most soil physical and chemical properties as well as trace elements of studied soil compared to the control treatment. These increases depended upon the type of the application level of organic and inorganic materials (Hamed *et al*., 2014 and Muhammad Shafi and Muhammad Sharif, 2019).

The addition of nitrogen fertilization and humic acid led to an increase in electric conductivity, available K, the organic matter content of the sandy soil (Yang et al., 2019). Generally, the highest levels of micronutrients were showed in T4, T7, and T8 (50%N+ 50% compost, 25%N+ 25% compost+50% bio and 30%N+ 35% HA+35% bio) compared to the control treatment (Table 2). Also, soil available of Ca, Mag, Na were increased with the same treatments.

Table 2. Effect of different sources of nitrogen fertilization and humic acid application on trace elements and some soil characterization in sandy soil.

Soil property	Nitrogen fertilization and humic acid			
	T1- 100% mineral	T4- 50%N+ 50% compost	T7- 25%N+ 25% compost+ 50% bio	T8- 30%N+ 35% HA+35% bio
Sand (%)	88.5	86.5	85.0	85.0
Silt (%)	3.5	5.2	5.8	5.8
Clay (%)	8.0	8.3	9.2	9.2
Texture	sandy	sandy	sandy	sandy
ECe (dS/cm)	0.335	0.448	0.605	0.605
pH (1:1 suspension)	8.3	7.85	7.55	7.55
Organ meter (%)	0.065	0.088	0.105	0.105
Total N (%)	0.035	0.046	0.049	0.049
Total P (mg/kg)	0.436	0.766	0.892	0.892
Available K(meq/100g)	0.243	0.299	0.341	0.341
Available Ca (meq/100g)	4.8	3.5	2.7	2.7
Available Mg (meq/100g)	1.15	1.36	1.53	1.53
CaCo3 (%)	0.50	0.39	0.37	0.37
Available Na (meq/100g)	0.37	0.31	0.27	0.27
Fe(mg/kg)	4.3	5.5	6.5	6.5
Mn(mg/kg)	8.61	11.85	12.81	12.81
Cu (mg/kg)	2.33	2.70	3.34	3.34
Zn (mg/kg)	5.29	6.83	7.95	7.95

2. Growth vegetative characteristics:

It can be stated from the obtained data in Tables (3 and 4) that using different sources of nitrogen fertilization and humic acid application on leaf area, pruning wood weight, Leaf chlorophyll content and leaf mineral contents (N, P, K) of Flame seedless grapevines in 2019 and 2020 seasons. Obtained data clearified that the results took similar trend during the two studied seasons.

Table 3. Effect of different sources of nitrogen fertilization and humic acid application on Leaf area, pruning wood weight and total chlorophyll of Flame seedless grapevines during 2019 and 2020 seasons.

Treat	Leaf area (cm^2)			Pruning wood weight (kg)			Total chlorophyll (mg/g f.w)		
Charact-	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean
T1- 100% N control	139.1 B	141.8 B	140.4	1.37 B	1.42 B	1.39	34.12 B	43.15 B	38.63
T2- 75%N+ 25% HA	147.8 A	152.6 A	150.6	1.44 A	1.50 A	1.47	46.68 A	48.76 A	47.67
T3- 50%N+ 50% HA	149.6 A	154.8 A	152.2	1.45 A	1.53 A	1.49	46.56 A	48.91 A	47.74
T4- 50%N+ 50% compost	151.3 A	153.5 A	152.4	1.47 A	1.53 A	1.50	46.93 A	49.36 A	47.95
T5- 50%N+ 25% compost+25% bio	150.6 A	155.4 A	153.0	1.46 A	1.52 A	1.49	47.78 A	49.88 A	48.83
T6- 25%N+ 75% HA	152.3 A	155.0 A	153.7	1.48 A	1.54 A	1.51	47.72 A	49.96 A	48.84
T7- 25%N+ 25% compost+50% bio	154.5 A	156.8 A	155.7	1.50 A	1.56 A	1.53	47.98 A	50.11 A	49.05
T8- 30%N+ 35% HA+35% bio	154.8 A	156.1 A	155.5	1.48 A	1.57 A	1.53	48.45 A	49.96 A	49.21

Number followed by the same letter in the same column are not significantly different at 0.5% level of probability.

Table 4. Effect of different sources of nitrogen fertilization and humic acid application on leaf N, P and K content of Flame seedless grapevines during 2019 and 2020 seasons.

Treat-	N %			P %			K %		
Charact-	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean
T1- 100% N control	1.83 B	1.92 B	1.87	0.218 C	0.206 C	0.212	1.48 C	1.59 C	1.53
T2- 75%N+ 25% HA	1.95 A	2.03 A	1.99	0.256 B	0.244 B	0.250	1.75 B	1.87 A	1.81
T3- 50%N+ 50% HA	1.96 A	2.05 A	2.01	0.261 B	0.250 B	0.256	1.78 A	1.90 AB	1.84
T4- 50%N+ 50% compost	1.98 A	2.06 A	2.02	0.263 B	0.250 B	0.257	1.71 B	1.83 B	1.77
T5- 50%N+ 25% compost+25% bio	1.96 A	2.06 A	2.01	0.275 A	0.262 A	0.269	1.74 B	1.86 AB	1.80
T6- 25%N+ 75% HA	1.98 A	2.10 A	2.04	0.265 A	0.255 A	0.260	1.81 A	1.92 A	1.87
T7- 25%N+ 25% compost+50% bio	2.01 A	2.11 A	2.06	0.276 A	0.263 A	0.270	1.76 AB	1.85 AB	1.82
T8- 30%N+ 35% HA+35% bio	2.03 A	2.11 A	2.07	0.275 A	0.266 A	0.271	1.77 AB	1.87 AB	1.82

Number followed by the same letter in the same column are not significantly different at 0.5% level of probability.

In a general view, data in prementioned tables showed that the application of the required N through using 75, 50, 25 or 30% of the recommended dose of nitrogen (RDN) as mineral N along with using 25 or 50% as Humic acid (HA) or Compost and Bio-mix significantly increased such traits compared to using RDN only as a mineral N fertilizer. The maximum values of leaf area, pruning wood weight, Leaf chlorophyll content and leaf mineral contents were recorded on the vines that were fertilized with triple form either, (25%N+ 25% compost+50% bio-mix) or (30%N+ 35% HA+35% bio-mix) . On other hand, the lowest values of the growth traits were recorded for the vines that were treated with 100% mineral N (check treatment). The highest leaf area (155.7cm2), pruning wood weight (1.53kg/vine), , total chlorophyll (49.21%), leaf N (2.07%) leaf P (0.271%) and leaf K (1.82% as an av. of the two studied seasons) were obtained due to use triple form, (25%N+ 25% compost+50% bio-mix) or (30%N+ 35% HA+35% bio-mix) or (25%N+ 75% HA). On other hand, the lowest values of these traits were recorded on the vines treated with 100% mineral N (control). Then, the increment percentage of leaf area, pruning wood weight, total chlorophyll and leaf N P K % were (10.89, 10.07, 27.39, 10.69, 27.83 and 18.95% as an av. the two studied seasons) due to use any triple form compared to the check treatment, respectively. No significant differences were found due to fertilize by double or triple forms. Therefore, N fertilization with Humic acid, Compost or Bio-mix as a partial substitute for mineral ones significantly increased the total leaf surface area, nutritional status and vegetative growth of vines.

3. Yield and cluster characteristics:

Data presented in Table (5) showed that using different sources of nitrogen fertilization and humic acid application on yield/vine, cluster weight, berry weight, and compactness coefficient of Flame Seedless grapevines in 2019 and 2020 seasons. Using nitrogen fertilization as combination form (mineral-plus HA or Compost and bio-mix) significantly increased the yield/vine and cluster weight and decreased compactness coefficient of cluster compared to application of N as 100% mineral fertilization.

Moreover, fertilized by combined forms gave the highest values of these traits and least values of compactness coefficient comparing checked treatment. The heaviest yield and cluster weight as well as berry weight and least values of cluster compactness coefficient were detected due to fertilize by triple form, whatever, (25%N+ 25% compost+50% bio-mix) or (30%N+ 35% HA+35% bio-mix).

The obtained highest values of yield/vine (9.66 kg), cluster weight (407.2g), berry weight (2.84g) and least cluster compactness coefficient (6.91) as an av. the two studied seasons due to fertilize any triple form, respectively. Contrarily, these values on checked vines were (8.63 kg), (367.4 g), (2.51) and (7.91), respectively. Hence the corresponding increment percentages for these traits over check treatment were (11.94%), (10.83 %) and (13.14 %) as well as the decrement percentage of cluster compactness coefficient was (12.64 %) as an av. the two studied seasons, respectively. No significant differences were recorded du to use double or triple form fertilization. In general, it could be concluded that combined (HA, Compost, and bio-mix) with mineral-N fertilization had positive effects on productivity of flame seedless grapevines.

4. Chemical constituents of berry juice:

Data of various berry characteristics as affected by different studied treatments during 2019 and 2020 seasons are presented in Tables (6). The data indicated that using double or triple form of ferilization significantly improved the Flame Seedless grapes quality in terms of increasing total soluble solids, reducing sugars and anthocyanin contents and decreasing total acidity compared to checked treatment (100% mineral N).

The highest total soluble solids, reducing sugars and anthocyanin contents were (16.1%), (12.90%) and (1.45mg/100g) as an av. of the two studied seasons obtained on vines fertilized with any triple form. Contrary, the least values of these traits were recorded on vines that fertilization by (100% mineral N cheked treatment) which gave (15.1%), (11.79%) and (1.35) as an av. of the two studied seasons, respectively.

Hence, the increment percentage of these attributes due to using fertilization via triple form over the check treatment attained (6.62%, 9.41 & 7.40%), respectively. The least values of acidity was recorded on vines that fertilization by triple form, was (0.43 %) compared to 0.50% as an av two studied seasons on check vins. Hence such amending induce decrement percentage in total acidity attained (10.00 %) as an av. of the two studied seasons.

On the account of the present results, it could be concluded that applying vines with 25 to 50% of nitrogen requirements plus HA or compost and bio-mix improved the growth and nutritional status, as well as, yield, cluster attributes and berry quality of Flame Seedless grapevines under the circumstances of this experiment.

Table 5. Effect of different sources of nitrogen fertilization and humic acid application on yield, cluster weight, compactness coefficient and berry weight of Flame seedless grapevines during 2019 and 2020 seasons.

treat	Yield/vine (kg)			Cluster weight (g)			Compactness coefficient %			Berry weight (g)		
	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean	2019	2020	2019
T1	8.42 B	8.85 B	8.63	358.6 B	376.3 B	367.4	8.05 A	7.76 A	7.91	2.43 B	2.58 B	2.51
T2	8.98 A	9.52 A	9.25	383.9 A	403.8 A	393.9	7.38 B	6.45 B	6.91	2.69 A	2.85 A	2.77
T3	9.10 A	9.70 A	9.40	386.3 A	410.5 A	398.4	7.45 B	7.03 B	7.24	2.68 A	2.89 A	2.79
T4	9.15 A	9.75 A	9.45	389.8 A	412.3 A	401.1	7.19 B	6.78 B	7.08	2.71 A	2.89 A	2.80
T5	9.08 A	9.64 A	9.36	385.4 A	408.2 A	396.8	7.15 B	6.80 B	6.97	2.70 A	2.90 A	2.80
T6	9.20 A	9.60 A	9.40	391.6 A	403.6 A	397.6	7.24 B	6.81 B	7.02	2.72 A	2.84 A	2.78
T7	9.31 A	10.0 A	9.66	396.5 A	415.2 A	405.9	7.10 B	6.73 B	6.91	2.76 A	2.81 A	2.79
T8	9.18 A	9.85 A	9.52	400.1 A	414.3 A	407.2	7.17 B	6.85 B	7.01	2.78 A	2.90 A	2.84

Number followed by the same letter in the same column are not significantly different at 0.5% level of probability

Table 6. Effect of different sources of nitrogen fertilization and humic acid application on TSS, acidity, reducing sugars and anthocyanin of Flame seedless grapevines during 2019 and 2020 seasons.

treat	TSS (%)			Acidity (%)			Reducing sugars (%)			Anthocyanin (mg/100g)		
	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean	2019	2020	2019
T1	14.9 B	15.2 B	15.1	0.52 A	0.48 A	0.50	11.78 B	12.16 B	11.79	1.33 B	1.37 B	1.35
T2	15.6 A	15.8 AB	15.7	0.49 BC	0.45 BC	0.47	12.46 A	12.80 A	12.63	1.39 A	1.44 A	1.42
T3	15.7 A	15.9 A	15.8	0.48 BC	0.45 BC	0.47	12.53 A	12.76 A	12.65	1.40 A	1.44 A	1.42
T4	15.7 A	16.0 A	15.9	0.49 BC	0.45 BC	0.47	12.50 A	12.85 A	12.68	1.41 A	1.45 A	1.43
T5	15.9 A	16.1 A	16.0	0.48 BC	0.44 BC	0.46	12.68 A	12.94 A	12.81	1.42 A	1.46 A	1.44
T6	15.8 A	16.1 A	16.0	0.47 C	0.44 BC	0.46	12.73 A	12.92 A	12.83	1.41 A	1.45 A	1.43
T7	15.9 A	16.3 A	16.1	0.47 C	0.43 C	0.45	12.70 A	12.98 A	12.84	1.41 A	1.48 A	1.45
T8	16.0 A	16.2 A	16.1	0.47 C	0.43 C	0.45	12.77 A	13.02 A	12.90	1.43 A	1.47 A	1.45

Number followed by the same letter in the same column are not significantly different at 0.5% level of probability.

Discussion:

Nitrogen fertilization is one of the important tools in increasing crop yield. Nitrogen plays a key role in the nutrition of fruit trees. It is a necessary element for chlorophyll, protoplasm and nucleic acids (Nijjar., 1985).

Using the organic and bio-fertilizer as well as Humic acid improve the growth and berry characteristics due to the reliable role of them on enhancing the waterholding capacity, soil structure aggregation, soil organic matter and humid substances may increase the availability of nutrients and reduce soil pH and salinity (Nijjar, 1985; Darwish *et al*., 1995; Lee *et al*., 2004 Zhang *et al*., 2010; Asgharzade and Babaeian 2012 and Suh *et al*., 2014). Moreover, they activate the availability uptake and translocation of most nutrients, that accelerating carbohydrate and protein synthesis and nutrient movement, encouraging cell division and development of meristematic tissues. In addition, it induces resistance of plant to root diseases and controlling vegetative growth of tree, then, improving its productivity (Gaur *et al*., 1980, Suba Rao., 1984 and Kannaiyan., 2002). Current study showed that the application of organic and bio fertilization as well as humi acid result significantly increased the leafe area about 11%, chlorophyll 24%, N 11% and K 19%. Moreover, these applications significantly increased yield/vin about 12% and beery weight 13%, as well as significantly improved TSS about 6% and decreased acidity 10%. Hence these treatments lead to increase the yield and hasting ripening with good berry quality which lead increase backable yield for exporting. Above mentioned results were in accordance with those obtained by Abdel-Monem *et al*., (2008); Mostafa. (2008); Ferrara and Brunti (2010); El-Sabagh *et al*. (2011); Masoud (2012); Abdelaal *et al* (2013); Abd El- Kareem (2014); Mohamadiniea *et al*., (2015); Ibrahim and Ali., (2016) ; El-Salhy *et al*. (2017); Akin., (2018) and Popescu and Popescu., (2018). They concluded that humic , organic and bio fertilization applied could be improve the growth aspects, yield and fruit quality of different grape cultivars.

CONCLUSION

Therefore, it could be concluded that using 25 to 50% of nitrogen requirements plus humic acid, compost and bio-mix improve the vine nutrient status, yield and fruit quality leading to an increase of the packable yield. In addition, improve some soil physical and chemical properties, as well as it minimizes the production costs and environmental pollution which could be occurred by excess of chemical fertilizers.

REFERENCES

Abdelaal, A.H.M.; Ahmed, F.F.; Ebragiem, M.E. and AbdelKareem, A.M. (2013): The beneficial effects of some humic acid, EM1 and weed control treatments on fruiting of Superior grapevines. Stem cell, 4 (3): 258-32.

Abd El- Kareem, A.M. (2014): The beneficial effects of biofertilization and weed control on fruiting of Superior seedless grapevines. Ph.D. Thesis Fac. of Agric. Al - Azhar Univ. (Assiut branch). Egypt.

Abd El-Nasser, G. and M.M. Harhash (2000). Effect of organic manures in combination with elemental sulphur on soil physical and chemical characteristics, yield fruit quality, leaf water contents and nutritional status of Flame seedless grapevines. 1- Soil physical and chemical characteristics. J. Agric. Mansoura Univ., 25 (6): 3541- 3555, Egypt.

Abdel-Monem, E.A.A.; M.A.S. Saleh and E.A.M. Mostafa. (2008). Minimizing the quantity of mineral nitrogen fertilizers on grapevine by using humic acid, organic and biofertilizers. Res. Agric. and Biol. Sci., 4 (1): 46-50.

Akin, A. (2018). The effects of some summer pruning and Humic substance applications on the nutritional value of Alphonse Levallee grape cultivar.Erwerbs-Obstabau,60(3):271:274.

AOAC. Association of Official Agricultural Chemists (1985): Official methods of Analysis, A.O.A.C., Benjamin Franklin Station. Washington D.C., U.S.A.pp.440-512.

Asgharzade, A. and M. Babaeian (2012). Investigation the effect of humic acid and acitic acid foliar application on yield and leaves nutrient content of grape. Afr. J. Microbiol. Res., 6(32) 6049-6054.

Biala, J. (2000). The use of recycled organics compost in viticulture – a review of the inter-national literature and experience. Proceedings of the 6th International Congress on Organic Viticulture, 25-26 August 2000, Basel, Switzerland. p.130-134.

Calleja-Cervantes ME, Menéndez S, Fernández-González AJ, Irigoyen I, Cibriáin-Zabalza JF, Toro N, AparicioTejo PM, Fernández-López M, (2015). Changes in soil nutrient content and bacterial community after 12 years of organic amendment application to a vineyard. Eur J Soil Sci, 66 (4): 802-812.

Darwish, O.H.; N. Persaud and P.C. Martens. (1995). Effect of long term application of animal manure on physical properties of three soils. Plant and Soil, 175: 289-295.

De-El, J.R. and R.K. Prange (1993). Post harvest physiological disorders diseases and mineral concentrations of organically and conventionally grown McIntoch and Cortland apples. Canadian J. Plant Sci., 18 (8B): 559-574.

Duncan, D.B. (1955). Moldable rang and moldable F test. Biometrics 11: 1-24.

El-Sabagh, A.S.; F.M. El-Morsy and A.R. Farag. (2011). Effect of biofertilizers as a partial substitute for nitrogen on vegetative growth, yield, fruit quality and leaf mineral content of two seedless grape cultivars. 1-Vegetative growth and yield. J. Horti. Sci. & Ornam. Plants, 3 (2): 166-175.

El-Salhy, A.M.; H.M. Mazrouk and M.M. El-Akkad. (2006). Biofertilization and elemental sulphur effects on growth and fruiting of King's Ruby and Roomy grapevines. Egyptian J. Horti., 33: 29- 44.

El-Salhy, A.M.; M.M. El-Akkad; M. Fatma. and A.M Marwa. (2017). The role of bio-fertilization in improving the growth and fruiting of thompson seedless grapevines. Assiut J. Agric. Sci., 48 (5) : 167-177.

FAOstat, (2019). www.fao.org.

Ferrara, G. and G. Brunetti, (2010). Effects of the times of application of a soil humic acid on berry quality of table grape (*Vitis vinifera* L.) cv Italia. Spanish Journal of Agricultural Research, 8: 817-822.

Fuentes, S., Rogers, G., Conroy, J., Jobling, J., Camus, C., Mercenaro, L. (2008). A soil-plant-atmosphere approach to evaluate the effect of irrigation strategy on Grapevine (cv. Shiraz) water and nutrient uptake, grape quality and yield. Acta Hort. 792, 297-303.

Gaur, A.C, K.P. Qstwal and R.S. Mathur (1980): Save superphosphate by using phosphor-bacteria. Kheti, 32: 23-35.

Gomez, K.A. and A.A. Gomez (1984): Statistical Procedures for Agricultural Research 2nd Ed. Wily, New York.

Hamed M. H., M. A. El-Desoky, A. M.Ghallab, M. A. Faragallah (2014). Effect of Incubation Periods And Some Organic Materials on Phosphorus Forms in Calcareous Soils. International Journal of Technology Enhancements and Emerging Engineering Research, Vol 2, Issue 6 108 ISSN 2347-4289.

Ibrahim, M.M. and A.A. Ali (2016). Effect of Humic acid on productivity and quality of Superior grape cultivat. Middle East J. Agric.Res., 5(2)239-246.

Jackson, M. L (1973). Soil Chemical Analysis. Prentice Hall, New Delhi.

Kannaiyan, S. (2002). Biotechnology of Biofertilizers. Alpha Sci.Inter. Ltd., P.O. Box 4067, Bourne R.G.8, UK, P.1-375.

Khalil, W., S.E. Abdel-Fattah and A.M. Kamel (1989). Effect of nitrogen levels and pruning severity on yield, juice quality and petiole nutrient consumption on Romy Ahmar grapes. Agric. Res. Rev., 67(3) :309-318, Egypt.

Korboulewsky, N., Robles, C., Garzino, S. (2004). Efects of sewage sludge compost on volatile organic compounds of wine from Vitis vinifera cv. Red Grenache. Am. J. Enol. Viticult, 55: 412-416

Lee C-H, Shin H-S, Kang K-H (2004). Chemical and spectroscopic characterization of peat moss and its different humic fractions (Humin, Humic acid and fulvic acid). J Soil Groundw Environ, 9:42–51.

Masoud, A.A.B. (2012). Effect of organic and bio nitrogen fertilization on growth, nutrient status and fruiting of Flame seedless and Ruby seedless grapevines. J. of Agric. And Biolo. Sci., 8 (2): 83-91.

Mba, C.C. (1994). Field studies on two rock phosphate solubilizing actionmycete isolates as biofertilizer sources. Environ. Management, 18(2): 236-369.

McLean, E.O (1982). Soil pH and lime requirement. P. 199-224 In A.L. Page, R.H. Miller and D.R. Keeney. Methods of soil analysis, part 2. Chemical and microbiological properties 2nd edition. Soil Sci. Soc. Am. Inc., Madison, WI, USA.

Miller, E.W.; R.L. Donahue and J.U. Miller. (1990). Soil "an introduction to soils and plant growth" Brentice Hall International Inc. Engle Word Cliffs, New Jersey, pp. 210- 220.

Mohamadineia, G., M.H. Farahi and M. Dastyaran (2015). Foliar and soil drench application of Humic Acid on yield and berry properties of Askari grapevine. Agric. Communications, 3 (2):21-27.

Montero, F.J., Juan, J.A., Cuesta, A., Brasa, A. (2000). Non-destructive methods to estimated leaf area in (*Vitis Vinifera L.*). Hort Sci., 35, 696-698.

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 Viti.,c 59: 364-374.

Mostafa, R.A.A. (2008): Effect of bio and organic nitrogen fertilization and elemental sulphur application on growth, yield and fruit quality of Flame seedless grapevines. Assiut J. Agric. Sci., 39 (1): 79-96.

Muhammad Izhar Shafi and Muhammad Sharif (2019). Soil Extractable Phosphorus Contents as Affected by Phosphatic Fertilizer Sources Applied with Different Levels of Humic Acid. Sarhad Journal of Agriculture. Volume 35 | Issue 4 | Page 1084

Nelson, R. E. (1982). Carbonate and gypsum. P. 181-198 In A. L. Page, R.H. Miller and D. R. Keeney. Method of soil analysis. part 2, Chemical and microbiological properties 2nd edition. Soil Sci. Soc. Am. Inc., Madison, WI, USA

Nijjar, G.S. (1985). Nutrition of Fruit Trees. Mrs. Usha Raji Kumar, Kilyani, New Delhia, India, 206-234.

Pinamonti F, (1998). Compost mulch effects on soil fertility, nutritional status, and performance of grapevine. Nutr Cycl Agroecosyst, 51: 239-248.

Popescu, G.C and Popescu (2018). Yield, berry quality and physiological response of grapevine to foliar humic acid application. Bragantia, 77(2):273-282.

Powell, K.S., Burns, A., Norng, S., Granett, J., McGourty, G. (2007). Influence of composted green waste on the population dynamics and dispersal of grapevine *phylloxera Daktulosphaira vitifoliae*. Agri. Ecosyst. and Environ. 119, 33-38.

Rabino, I. and A.L. Mancinelli (1986). Light, temperature and anthocyanin production. J. Plant Physiol., 81 (3): 922-924.

Sahrawat, K.L. (1979). Nitrogen losses in rice soils. Fert. News, 24: 38-48.

Snedecor, G.W. and W.G. Cochran (1990): Statistical Methods 7th Ed. The Iowa State Univ., Press.

Subba Rao, N.S. (1984). Bio fertilizers in Agriculture Oxford. IBH Company. New Delhi.

Suh HY, Yoo KS, Suh SG (2014). Tuber growth and quality of potato (*Solanum tuberosum* L.) as affected by foliar or soil application of fulvic and humic acids. Hortic Environ Biotechnol 55:183–189.

Wilde, S.A.; R.B. Corey; J.G. Lyer and G.K. Voigt (1985). Soil and Plant Analysis for tree cultivars. Oxford, IBH, New Delhi, India, pp: 94- 105.

Winkler, A.J.; A.J. Cook; W.M. Kliwer and L.A. Lider (1974): General Viticulture. Published by University of California Press, Barkley.

Yadava, U.L., (1986). A rapid and non-destructive method to determine chlorophyll in intact leaves. Hort. Sci., 21: 1449-1450.

Yang, X., X. Chen and X. Yang. 2019. Effect of organic matter on hosphorus adsorption and desorption in a black soil from Northeast China. Soil Tillage Res., 187: 85-91.

Zhang, J.J.; L.B. Wang and C.L. Li (2010). Hamus characteristic after maize residues degradation in soil amended with different copper concentrations. Plant Soil Environ, 56: 120-124.

تأثير التسميد العضوي والحيوي وحامض الهيوميك عل نمو وإثمار كروم العنب الفليم تحت ظروف الأراضي الرمليه

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أجريت هذه الدراسة خلال موسمين متتاليين ٢٠١٩، ٢٠٢٠ علي كروم العنب الفليم اللابذري بمزرعة خاصه بمنطقة نجع حمادي - محافظة قنا - جمهورية مصر العربية. بهدف دراسة تأثير إضافة مصادر مختلفه من التسميد النيتروجيني وحامض الهيوميك على نمو وإثمار عنب الفليم تحت ظروف الأراضي الرمليه. وقد تم إضافة التسميد المعدني علي ثلاث مرات والكمبوست مره واحده اول مارس أما حامض اليهوميك والسماد الحيوي تم اضافتهما مرتين اول مارس وبعدها بشهر.ويمكن تلخيص أهم النتائج فيما يلي:أدي إضافة الاسمده النيتروجينه في الصوره الثنائيه او الثلاثيه بمعدل (٢٥-٥٠ % معدني) مضافا اليها حامض الهيوميك أوالكمبوست والاسمده الحيويه الي حدوث زياده معنويه في صفات النمو الخضري والمحصول وتحسين خصائص حبات العنب الفليم. أشارت النتائج إلى أن معظم العناصر الصغرى و بعض الخصائص الفيزيائية والكيميائية للتربة زادت مع زيادة مستوى التسميد العضوي والحيوي وحمض الهيوميك في التربة تحت الدراسة. من نتائج هذه الدراسة يمكن التوصية بإضافة الجرعه الموصي بها من السماد النيتروجيني في الصوره الثنائيه (٥٠% معدني+ ٥٠% حامض هيوميك او كمبوست) أو الصوره الثلاثيه (٢٥% معدني+ ٢٥% كمبوست+ ٥٠% حيوي) او (٣٠% معدني+ ٣٥% عضوي+ ٣٥% حيوي) وذلك لتحسين خواص التربه الفزيائية والكيميائية وأيضا للحصول علي نمو خضري جيد ومحصول عال مبكر ذو عناقيد وحبات ذات خصائص ممتازة تتفق مع سوق التصدير والقدرة التنافسية بالأسواق الخارجية فضلا عن تقليل تكاليف الإنتاج والتلوث البيئي .