

## Response of Superior Grapevines to Spraying Fenugreek and Rocket Seed Sprouts as well as Garlic Oil

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**Abstract:** During 2015 and 2016 seasons, Superior grapevines grown under Souhag climatic conditions treated with fenugreek and rocket seed sprouts at 0.025 to 0.1 % and garlic oil at 2.5 to 10 % either alone or in combinations. The vines received three sprays. The goal was selecting the best plant extracts that responsible for improving yield and quality of the berries. Single and combined applications of fenugreek and rocket seed sprouts each at 0.025 to 0.1 % and garlic oil at 2.5 to 10 % had an obvious promotion on leaf area, main shoot length, N, P, K, Mg and Ca (as %), yield, weight and dimensions of cluster as well as physical and chemical characteristics of the berries relative to the control. There was a remarkable reduction on shot berries with using plant extract treatment over the control. The best materials in improving growth, yield and berries quality could be arranged as follows in descending order garlic oil, rocket and fenugreek seed sprouts. Combined applications were preferable than using each material alone in this respect. The best results with regard to yield and berries quality of Superior grapevines grown under Souhag region were obtained due to treating the vines with fenugreek and rocket seed sprouts at 0.05 % plus garlic oil at 5 % three times.

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**Key Words:** Superior grapevines; Rocket and fenugreek seed sprouts, Garlic oil; yield; berries quality.

### 1. Introduction

In the past, promoting the yield and fruit quality was achieved by using chemical fertilizers. For avoiding environmental pollution, many studies were accomplished for using crop seed sprout extracts versus chemicals.

Recently, plant extracts such as oils and seed sprouts were greatly useful for improving the production of the different grapevines especially those grown under sandy soil as alternatives to chemical fertilizers that cause huge pollution in our environment and had an inferior effect on marketing processes. Plant oils and crop seed sprouts were found to improve growth, vine nutritional status, yield and quality of different fruit crops.

Germination and sprouting of seeds in different crops may change the content and composition of foods namely proteins, fats and amino acids and enhances the building and biosynthesis of essential amino acids like glutamic acid, tryptophan, arginine, methionine and lysine, vitamin B & C and all macro and micro nutrients and makes them high available to the trees (Cazuola *et al.*, 2004; Cairney, 2005; Biomerson, 2007; Abdallah, 2008 and Anwar *et al.*, 2013)

Previous studies showed that treating fruit crops with crop seed sprouts had a striking effect on growth, tree nutritional status, yield and fruit quality (Refaai, 2014 a & b; Ahmed and Gad El-Kareem, 2014; El-Khawaga and Mansour, 2014; Ahmed

and Habasy-Randa, 2014 and Abd El-Rahman, 2015; Ahmed, 2015; Masoud, 2017 and Allam, 2017).

Plant extracts was found by Uwakiem, (2014); Shoug, (2015); Ahmed *et al.*, (2015); Wassel *et al.*, (2016); Zagzog and Saied, (2017); Ebrahiem, (2018) and Ahmed-Fatma, (2018) to enhance growth and fruiting of different crop fruits.

The target of this study was elucidating the effect of rocket and fenugreek seed sprouts and garlic oil on fruiting of Superior grapevines grown under Souhag climatic conditions.

### 2. Material and Methods

This study was carried out during 2015 and 2016 seasons on 78 uniform in vigour 10-years old Superior grapevines. The selected vines are grown in a private vineyard located at Gerga district, Souhag Governorate where the texture of the soil is sandy (Table 2). Soil analysis was done according to the procedures that outlined by Cottenie *et al* (1982).

The selected vines are planted at 2 x 3 meters apart (700 vines/feddan). The chosen vines were trained by cane pruning method leaving 72 buds/vine (six fruiting canes x 10 eyes plus six renewal spurs / two buds) using Gable supporting system. Winter pruning was carried out at the second week of Jan. during both seasons. Drip irrigation system was followed using well water containing 1000 ppm

salinity. All fertilizers were added with irrigation water (fertigation).

This study was planned to examine the effect of single and combined applications of rocket and fenugreek seed sprouts and garlic oil on some growth aspects, vine nutritional status, berry setting %, yield, shot berries % and berries quality of Superior grapevines growing under sandy soil.

**Table (1): Analysis of the tested soil**

Constituent	Values
Sand %	76.2
Silt %	12.1
Clay %	11.7
Texture	Sandy
O.M. %	0.11
pH ( 1: 2.5 extract)	7.69
EC ( 1:2.5 extract) (ppm)	1.56
CaCO <sub>3</sub> %	3.00
Total N %	0.005
Available P (Olsen method, ppm)	1.1
Available K ( ammonium acetate, ppm)	31.0

Except those dealing with the present treatments (application of different plant extracts) all the selected vines (78 vines) received the usual horticultural practices that are commonly applied in the vineyard.

This study consisted from the following ten treatments:

- 1- Control.
- 2- Spraying fenugreek seed sprout at 0.025 % (0.25 g/l).
- 3- Spraying fenugreek seed sprout at 0.05 % (0.5 g/l).
- 4- Spraying fenugreek seed sprout at 0.1 % (1g/l).
- 5- Spraying rocket seed sprout at 0.025 % (0.25 g/l).
- 6- Spraying rocket seed sprout at 0.05 % (0.5 g/l).
- 7- Spraying rocket seed sprout at 0.1 % (1g/l).
- 8- Spraying garlic oil at 2.5 % (25 ml/l).
- 9- Spraying garlic oil at 5.0 % (50ml/l).
- 10- Spraying garlic oil at 10 % (100 ml/l).
- 11- Spraying fenugreek and rocket seed sprouts each 0.025 % + garlic oil at 2.5%.
- 12- Spraying fenugreek and rocket seed sprouts each 0.05 % + garlic oil at 5%.
- 13- Spraying fenugreek and rocket seed sprouts each 0.1 % + garlic oil at 10%.

Each treatment was replicated three times, two vines per each. The two crop seed sprout extracts (fenugreek and rocket) were sprayed three times at growth start (2nd of Mar.), just after fruit setting (last

week of Apr.) and one month later (last week of May). Triton B as a wetting agent was added to all extracts at 0.05 % and spraying was done till runoff.

**Chemical composition of the two crop seed sprout extracts (fenugreek and rocket) are shown in Tables (2 to 4). Extracts of the two crop seed sprouts were prepared by germinating of the seeds and when the plant height reached ten cm, they were harvested and put in the refrigerator at C<sup>0</sup> till use. As the time of application they were blended in electric blender.**

**Table 2: Chemical composition of fenugreek seed sprout**

Constituent Values	(mg/ 100 g F.W.)
Aspartic acid	2.2
Arginine	2.1
Alanine	2.9
Isoleucine	2.1
Cysteine	1.9
Cystine	1.8
Glutamic acid	2.0
Methionine	6.0
Lysine	5.1
Vitamin A	1.0
Vitamin B1	0.32
Vitamin B2	0.30
Vitamin B6	1.0
Vitamin C	2.0
Ca	220
P	341
K	469
Mg	371
Fe	242
Phytic acid	0.9
Niacin	1.4

**Table 3: Chemical composition of rocket seed sprout**

Constituent Values	(mg/ 100 g F.W.)
Riboflavin	0.15
Cysteine	3.9
Cystine	4.1
Glutamic acid	3.5
Methionine	3.8
Thamine	0.16
Vitamin A	4.4
Vitamin E	0.94
Vitamin C	101
P	1410
K	496
Mg	460
Fe	267
Mn	16
Zn	255

**Table 4: Chemical composition of garlic oils (according to Mnayer *et al.*, 2014)**

Compounds	Values (mg/100g D.W)
Dipropyl disulfide	0.25
Diallyl disulfide	37.90
Dimethyl trisulfide	0.33
Dimethyl thiophene <sup>a</sup>	0.08
Allyl methyl disulfide	3.69
Methyl propyl disulfide	0.25
Methyl 1-propenyl disulfide <sup>a</sup>	0.46
Allyl propyl sulfide	0.09
Bis-(1-propenyl)-sulfide <sup>a</sup>	0.08
Diallyl sulfide	6.59
Dimethyl disulfide	0.15
Allyl methyl tetrosulfide	1.07
Allyl propyl trisulfide	0.23
Diallyl trisulfide	28.06
Eugenol	0.23

Randomized complete block design (RCBD) was adopted for laying out the experiment (Rangaswamy, 1995 and Rao, 2007) where the present experiment contained of thirteen treatments from single and combined applications of fenugreek and rocket seed sprouts and garlic oil and each treatment was replicated three times 2 vines per each.

### 1- Measurements of vegetative growth characteristics:

At the last week of May during both seasons, the following two growth aspects area were recorded as follows:

1. Average main shoot length (cm.) as a result of measuring the length of the labeled ten main shoots per vine and then the average was calculated.

2. Average leaf area (cm<sup>2</sup>) was obtained by measuring the diameter of twenty mature leaves from those opposite to the basal clusters on the main shoots. (Summer, 1985).

Leaf area (cm<sup>2</sup>) was measured using the following equation as outlined by Ahmed and Morsy (1999).

Leaf area (cm<sup>2</sup>) = 0.45 (0.79 × d<sup>2</sup>) + 17.77, where d is the maximum diameter of leaf, then the average leaf area was registered.

### 2- Measurements of leaf content of N, P, K, Mg and Ca:

Petioles of the same leaves that were taken for measuring the leaf area (according to Summer, 1985) were oven dried at 70°C and grinded then 0.5 g weight of each sample was digested using H<sub>2</sub>SO<sub>4</sub> and H<sub>2</sub>O<sub>2</sub> until clear solution (Cottenie *et al.*, 1982).

In the digested solutions, leaf content of N, P, K, Mg and Ca were determined as follows:

1- Nitrogen % by the modified microkjelahle method as described by Peach and Tracy (1968).

2- Phosphorus % by using Olsen method as reported by Evenhuis and Deward (1980).

3- Potassium % by using Flame photometer as outlined by Cottenie *et al.*, (1982).

4- Magnesium and calcium % by titration against EDTA as described by Chapman and Pratt (1987).

### 3- Measurements of yield as well as physical and chemical characteristics of the berries

Harvesting took place when T.S.S./ acid in the berries of the check treatment (vines received N as 100% inorganic N form) reached at least 25: 1 at the last week of June during both seasons (according to Winkler *et al.*, 1974 and Weaver, 1976). The yield of each vine was recorded in terms of weight (in kg.) and number of clusters per vine, then the average weight of cluster (g.) was recorded. Five clusters per each vine were taken at random for determinations of the following physical and chemical characteristics of the berries:

1- Cluster dimensions ( length and shoulder, cm)

2- Shot berries was estimated by dividing number of small berries by total number of berries, cluster and multiplying the product x 100.

3- Average berry weight (g.) and dimensions (longitudinal and equatorial, cm)

4- Percentage of total soluble solids in the juice by using a hand refractometer.

5- Percentage of total titratable acidity (as gram tartaric acid / 100 ml juice) by titration against 0.1 N NaOH using phenolphthalein as indicator (A.O.A.C, 2000).

The proper statistical analysis was done. Treatment means were compared using new L.S.D. at 5% (according to Mead *et al.*, 1993).

## 3. Results

### 1- Effect of single and combined applications of fenugreek and rocket seed sprouts and garlic oil on the main shoot length and leaf area:

It is obvious from the obtained data in Table (5) that treating the vines with fenugreek and rocket seed sprouts each at 0.025 to 0.1 % and garlic oil at 2.5 to 10 % either applied alone or in combinations significantly was accompanied with stimulating main shoot length and leaf area over the control treatment. The stimulation on such two growth aspects was significantly correlated with using garlic oil at 2.5 to 10 %, rocket and fenugreek seed sprouts each 0.025 to 0.1 %, in descending order. There was a progressive increasing on such two traits with

increase concentrations of fenugreek and rocket seed sprouts and garlic oil. Increasing concentrations of fenugreek and rocket seed sprouts from 0.05 to 0.1 % and garlic oil from 5 to 10 % had no significant promotion on the main shoot length and leaf area. Combined applications of the three plant extracts (fenugreek and rocket seed sprouts and garlic oil) was significantly superior than using each plant extract alone in enhancing such two growth characteristics. Using fenugreek and rocket seed sprouts and garlic oil at the higher concentration gave the maximum values of main shoot (127.3 & 128.4 cm) and leaf area (112.6 & 115.6 cm<sup>2</sup>) during both seasons, respectively. The untreated vines produced the minimum values. The results were true during both seasons.

### **2- Effect of single and combined applications of fenugreek and rocket seed sprouts and garlic oil on the percentages of N, P, K, Mg and Ca in the leaves:**

It is revealed from the obtained data in Table (5) that treating the vines with fenugreek and rocket seed sprouts each at 0.025 to 0.1 % and garlic oil at 2.5 to 10 % significantly was followed by enhancing the percentages of N, P, K, Mg and Ca in the leaves relative to the control treatment. The promotion on these nutrients was significantly related to increasing concentrations of each natural material. Increasing concentrations of fenugreek and rocket seed sprouts from 0.05 to 0.1 % as well as garlic oil from 5 to 10 % had meaningless stimulation on these nutrients. Treating the vines with garlic oil, rocket and fenugreek seed sprouts, in descending order was significantly very effective in enhancing these nutrients. Varying plant extract treatments had significant effect on these chemical components. Combined applications of these extracts were significantly superior than using each material alone. Treating the vines with all materials together at the higher concentration gave the maximum N (2.32 & 2.33 %), P (0.172 & 0.177 %), K (1.64 & 1.68 %), Mg (0.97 & 0.99 %) and Ca (3.12 & 3.14 %) during both seasons, respectively. The lowest values recorded on untreated vines. These results were true during both seasons.

### **3- Effect of single and combined applications of fenugreek and rocket seed sprouts and garlic oil on yield and cluster aspects:**

It is obvious from the obtained data in Table (5) that yield expressed in weight (kg) and number of clusters/vine and weight, length and shoulder of cluster were significantly improved due to treating the vines with fenugreek and rocket seed sprouts each at 0.025 to 0.1 % and garlic oil from 2.5 to 10 % either applied alone or in combinations. There was a gradual stimulation on the yield and cluster aspects

with increasing concentrations of the three natural materials. Significant differences on these parameters were observed among all concentrations of the three plant extracts except among the higher two concentrations. The best materials in improving yield and cluster aspects were garlic oil and sprouts of rocket and fenugreek seeds, in descending order. Combined applications were significantly favourable than using each material alone in improving yield and cluster aspects. Since no significant promotion on these parameters among the medium and high concentration of fenugreek and rocket seed sprouts (0.05 and 0.1 %) and garlic oil (5.0 and 10.0 %), therefore, from economical point of view, it is recommended to spray all materials together at the medium concentrations (0.05 % for both fenugreek and rocket seed sprouts and 5 % for garlic oil). Under such promised treatment, yield per vine reached 10.6 and 15.3 kg during both seasons, respectively. The yield of untreated vines reached 8.1 and 8.2 kg during both seasons, respectively. The percentage of increment on the yield owing to using the previous promised treatment over the control treatment reached 30.9 & 86.6 % during both seasons, respectively. The untreated vines produced the minimum values. Number of clusters in the first seasons of study was significantly unaffected by the present treatments. These results were true during both seasons.

### **4- Effect of single and combined applications of fenugreek and rocket seed sprouts and garlic oil on the percentage of shot berries:**

It is noticed from the data in Table (6) that percentage of shot berries was significantly controlled by using single and combined applications of fenugreek and rocket seed sprouts and garlic oil. The reduction on the percentage of shot berries was significantly in proportional to the increase in the two crop seed sprout concentrations from 0.025 to 0.1% and garlic oil from 5 to 10 %. The best plant materials in controlling shot berries were garlic oil, rocket and fenugreek seed sprouts, in descending order. Negligible effect on shot berries % was noticed among the higher two concentrations of each material. Combined applications of these materials were significantly preferable than using each material alone in checking such undesirable phenomenon. The minimum values (2.5 & 2.2 %) of shot berries were recorded on the vines that treated with all plant materials together at the higher concentrations. The untreated vines produced the highest values (9.1 & 9.3 %) during both seasons, respectively. Similar trend was noticed during both seasons.

### 5- Effect of single and combined applications of fenugreek and rocket seed sprouts and garlic oil on the physical and chemical characteristics:

The obtained data in Table (7) noticeably reveal that single and combined applications of fenugreek and rocket seed sprouts each at 0.05 to 0.1 % as well as garlic oil at 2.5 to 10 % had significant promotive effect on quality of the berries in terms of increasing berry weight and dimensions (longitudinal and equatorial) and T.S.S. % and reducing total acidity % relative to the control treatment. The promotion on quality of the berries was significantly related to the increase in material concentrations. Using garlic oil as well as sprouts of rocket and fenugreek seed

sprout, in descending order was significantly responsible for enhancing quality of the berries. Increasing concentrations of each material from the medium to the high concentrations failed to show significant effect on quality of the berries. Combined applications were significantly useful on promotion quality of the berries than using each material alone. The best results were obtained due to treating the vines with the mixture of the three plant extracts together at the medium concentrations from economical of point view. The untreated vines produced the unfavourable effects on quality of the berries. These findings were the same during both seasons.

**Table (5): Effect of spraying fenugreek and rocket seed sprouts as well as garlic oil on some vegetative growth characteristics and leaf nutrients of Superior grapevines during 2015 & 2016 seasons**

Treatment	Main shoot length (cm.)		Leaf area (cm.)		Leaf N %		Leaf P %		Leaf K %		Leaf Mg%		Leaf Ca%	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	111.0	111.4	95.1	96.0	1.60	1.59	0.111	0.114	1.11	1.12	0.51	0.54	2.31	2.33
Spraying fenugreek seed sprout at 0.025 %	112.9	113.3	96.8	97.7	1.69	1.70	0.117	0.120	1.16	1.17	0.56	0.60	2.40	2.42
Spraying fenugreek seed sprout at 0.05 %	115.0	115.5	98.7	99.6	1.78	1.79	0.123	0.126	1.21	1.22	0.62	0.66	2.49	2.51
Spraying fenugreek seed sprout at 0.1 %	115.6	116.1	99.0	100.0	1.80	1.81	0.124	0.127	1.22	1.22	0.63	0.67	2.50	2.52
Spraying rocket seed sprout at 0.025 %	117.0	117.4	101.0	101.9	1.88	1.89	0.131	0.134	1.27	1.29	0.70	0.72	2.60	2.61
Spraying rocket seed sprout at 0.05 %	119.0	119.5	103.0	105.0	1.96	1.97	0.140	0.141	1.33	1.34	0.76	0.77	2.70	2.71
Spraying rocket seed sprout at 0.1 %	119.3	119.8	103.3	105.3	1.97	1.98	0.141	0.142	1.34	1.35	0.77	0.78	2.71	2.72
Spraying garlic oil at 2.5 %	121.4	121.8	105.0	107.1	2.06	2.06	0.150	0.150	1.41	1.42	0.81	0.83	2.81	2.81
Spraying garlic oil at 5.0 %	123.0	123.6	107.3	109.3	2.15	2.16	0.156	0.157	1.49	1.51	0.86	0.87	2.90	2.90
Spraying garlic oil at 10 %	123.3	123.6	108.0	110.0	2.16	2.17	0.157	0.163	1.50	1.52	0.87	0.88	2.91	2.91
Spraying all at low conc.	125.1	125.6	110.0	112.3	2.23	2.24	0.166	0.170	1.59	1.61	0.91	0.94	2.99	2.99
Spraying all at med. conc.	127.0	128.0	112.3	115.0	2.31	2.32	0.171	0.176	1.64	1.66	0.96	0.98	3.11	3.12
Spraying all at high conc.	127.3	128.4	112.6	115.6	2.32	2.33	0.172	0.177	1.64	1.68	0.97	0.99	3.12	3.14
New L.S.D. at 5%	1.4	1.7	1.4	1.6	0.05	0.06	0.005	0.004	0.04	0.04	0.03	0.04	0.07	0.08

**Table (6): Effect of spraying fenugreek and rocket seed sprouts as well as garlic oil on yield as well as cluster weight and dimensions of Superior grapevines during 2015 & 2016 seasons**

Treatment	No. of clusters/vine		Yield/vine (kg.)		Cluster weight (g.)		Cluster length (cm)		Cluster width (cm)	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	24.0	24.0	8.1	8.2	338.0	340.0	21.0	20.9	10.8	11.0
Spraying fenugreek seed sprout at 0.025 %	24.0	25.0	8.4	8.8	350.0	351.0	21.6	21.5	11.1	11.4
Spraying fenugreek seed sprout at 0.05 %	25.0	26.0	9.0	9.4	361.0	362.0	22.2	22.3	11.4	11.8
Spraying fenugreek seed sprout at 0.1 %	25.0	26.0	9.1	9.7	362.0	373.0	22.3	22.4	11.5	11.9
Spraying rocket seed sprout at 0.025 %	25.0	28.0	9.3	10.5	373.0	374.0	23.0	23.2	12.0	12.3
Spraying rocket seed sprout at 0.05 %	25.0	30.0	9.6	11.6	384.0	386.0	23.7	24.0	12.6	12.7
Spraying rocket seed sprout at 0.1 %	25.0	30.0	9.6	11.9	385.0	397.0	23.1	24.1	12.7	12.8
Spraying garlic oil at 2.5 %	25.0	32.0	9.9	12.8	396.0	399.0	24.5	24.7	13.1	13.3
Spraying garlic oil at 5.0 %	25.0	34.0	10.3	14.0	411.0	412.0	25.2	25.5	13.5	13.7
Spraying garlic oil at 10 %	25.0	34.0	10.3	14.1	413.0	414.0	25.3	25.6	13.6	13.8
Spraying all at low conc.	25.0	36.0	10.6	15.3	424.0	425.0	26.0	26.3	14.0	14.2
Spraying all at med. conc.	25.0	38.0	10.9	16.6	437.0	437.0	26.9	27.0	14.5	14.6
Spraying all at high conc.	25.0	38.0	11.0	16.7	438.0	439.0	27.0	27.1	14.6	14.7
New L.S.D. at 5%	NS	2.0	0.3	0.4	10.1	11.0	0.5	0.4	0.2	0.3

**Table (7): Effect of spraying fenugreek and rocket seed sprouts as well as garlic oil on the percentage of shot berries and some physical and chemical characteristics of the berries of Superior grapevines during 2015 & 2016 seasons**

Treatment	Shot berries (%)		Berry weight (g.)		Berry equatorial (cm)		Berry longitudinal (cm)		T.S.S.%		Total acidity %	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	9.1	9.3	3.11	3.20	2.00	2.00	2.25	2.26	17.5	17.3	0.701	0.699
Spraying fenugreek seed sprout at 0.025 %	8.5	8.5	3.26	3.35	2.05	2.05	2.30	2.32	18.0	17.8	0.681	0.666
Spraying fenugreek seed sprout at 0.05 %	7.4	7.5	3.42	3.51	2.10	2.09	2.35	2.37	18.5	18.3	0.660	0.641
Spraying fenugreek seed sprout at 0.1 %	7.3	7.2	3.43	3.52	2.11	2.11	2.36	2.38	18.6	18.4	0.659	0.640
Spraying rocket seed sprout at 0.025 %	6.6	6.5	3.63	3.72	2.16	2.16	2.41	2.40	19.1	19.0	0.640	0.620
Spraying rocket seed sprout at 0.05 %	6.0	5.9	3.84	3.93	2.22	2.22	2.47	2.50	19.6	19.4	0.618	0.604
Spraying rocket seed sprout at 0.1 %	5.9	5.8	3.85	3.95	2.23	2.24	2.48	2.51	19.7	19.5	0.617	0.603
Spraying garlic oil at 2.5 %	5.0	4.8	4.06	4.15	2.33	2.31	2.58	2.60	20.2	20.0	0.595	0.585
Spraying garlic oil at 5.0 %	4.0	3.9	4.27	4.36	2.40	2.38	2.66	2.69	20.6	20.4	0.571	0.564
Spraying garlic oil at 10 %	3.9	3.8	4.29	4.38	2.41	2.39	2.67	2.71	20.7	20.5	0.570	0.563
Spraying all at low conc.	3.0	2.9	4.50	4.60	2.50	2.49	2.75	2.78	21.1	21.0	0.550	0.540
Spraying all at med. conc.	2.6	2.4	4.71	4.80	2.55	2.50	2.82	2.83	21.6	21.5	0.530	0.520
Spraying all at high conc.	2.5	2.2	4.72	4.82	2.56	2.51	2.83	2.84	21.7	22.0	0.529	0.518
New L.S.D. at 5%	0.4	0.5	0.15	0.17	0.03	0.03	0.04	0.04	0.4	0.4	0.017	0.015

#### 4. Discussion

##### 1- Crop seed sprouts:

Germination or sprouting of seeds in various crops may change all complex substances such as proteins, carbohydrates and fats to simple ones and stimulates the occurrence of soluble sugars, amino acids, natural hormones and antioxidants. The higher content of sprouts from amino acids like cysteine, cysteine, methionine, tryptophan, glutamic acid, arginine, aspartic acid, thiamin, alanine, leucine and isoleucine, vitamins A, B & B<sub>2</sub> & B<sub>6</sub>, C and E and nutrients such as N, P, K, Mg, Ca, Fe, Mn and Cu is accompanied with protecting the trees from aging and unfavourable conditions and enhancing cell division and biosynthesis of carbohydrates and plant pigments (Camacho *et al.*, 1992; Cairney, 1995 and 2005; Cazuola *et al.*, 2004; Biommeron, 2007; Abdallah, 2008 and Anwar *et al.*, 2009). The results regarding the beneficial effects of rocket and fenugreek seed sprouts on growth and fruiting of Superior grapevines are in harmony with those obtained by (Refaai, 2014 a & b; Ahmed and Gad El- Kareem, 2014; El-Khawaga and Mansour, 2014; Ahmed and Habasy-Randa, 2014 and Abd El-Rahman, 2015; Ahmed, 2015; Masoud, 2017 and Allam, 2017).

##### 2- Plant oil extracts:

The higher content of oil and plant extracts from different active substances volatiles, vitamins, K, E, D, A, nutrients and antioxidants (Dhekney, 2016) could explain the promotive effect of garlic oil on growth and fruiting of Superior grapevines.

These results are in agreement with those obtained by Mekawy (2008); Ahmed *et al* (2014b); Uwakiem (2014); Ahmed (2016); Wassel *et al* (2016); El-Samman (2017); El-Salhy *et al* (2017); Ahmed *et al* (2017); Abdelaziz *et al* (2017a); Ibrahim-Asmaa (2017) and Ahmed-Fatma (2018).

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