Effect of Spraying Salicylic Acid, Some Crop Seed Sprouts and Turmeric Extract on Growth and Vine Nutritional Status of Superior Grapevines

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Abstract: This study was carried out during 2016 and 2017 seasons to examine the effect of spraying Superior grapevines with rocket and fenugreek seed sprouts and turmeric extract each at 0.05 o 0.2% and salicylic acid (SA) at 100 to 400 ppm on growth and vine nutritional status. The selected vines were sprayed three times with the investigated three plant extracts and salicylic acid at the growth start, just after berry setting, and 21 days after berry setting. Single and combined applications of fenugreek and rocket seed sprouts and turmeric extract at 0.05 to 0.2% and salicylic acid at 100 to 400 ppm caused a material promotion on all growth aspects namely main shoot length, number of leaves/shoot, leaf area, wood ripening coefficient, pruning wood weight and cane thickness and vine nutritional status namely chlorophylls a & b, total carotenoids, N, P, K, Mg, Zn, Fe and Mn in the leaves of Superior grapevines relative to the control. The best materials were rocket seed sprout, salicylic acid, turmeric extract and fenugreek seed sprout, in ascending order. Combined applications (SA at 200 ppm+ fenugreek seed sprout at 0.1%, SA at 200 ppm+ turmeric extract at 0.1% and SA at 200 ppm+ rocket seed sprout at 0.1%) were preferable than using each material alone in this respect. Carrying out three sprays of a mixture of salicylic acid at 200 ppm and fenugreek seed sprout at 0.1% at growth start, just after berry setting and three weeks later was responsible for enhancing growth and vine nutritional status of Superior grapevines.
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1. Introduction:

Nowadays, many attempts were accomplished for enhancing organic farming thought and preventing pollution in our environment. This is achieved by using plant extracts and crop seed sprouts and salicylic acid instead using chemical fertilizers.

The previous results showed that using crop seed sprouts was favourable in enhancing growth and tree nutritional status **Ahmed and Gad El- Kareem (2014)**, **El-Khawaga and Mansonr (2014), Mohamed, (2014), Refaai (2014 a and b), Abd El-Rahman (2015), Ahmed, (2015), Ahmed and Habasy- Randa (2017), Allam (2017)** and **Masoud (2017).**

Turmeric extract as mentioned by **Ahmed *et al.*, (2014), Osman (2014), Uwakiem (2014), Shoug (2015), Ahmed (2016), Abdelaziz *et al*., (2017a), Abd El-Hafiz (2017), Ebrahim-Rehab (2017)**, **Zagzog and Saied (2017)** and **Ahmed-Fatma (2018)** was found to enhance growth and tree nutritional status in different fruit crops.

The results of **El- Hanafy (2011)**, **El- Kady-Hanaa, (2011), Bondok- Sawsan *et al,* (2011), Mohamed- Ebtesam (2012), Gad El- Kareem and Abd El- Rahman (2013), Osman (2014), Abd El-Rady (2015)** and **Mohamed – Attiat, (2016)** emphasized the essential effect of salicylic acid on growth and tree nutritional status in different fruit crops.

Hereon, the present study was planned to evaluate the effect of rocket and fenugreek seed sprouts, turmeric extract and salicylic acid on vegetative growth characteristics and vine nutritional status of Superior grapevines.

2. Material and Methods:

This study was carried out during 2016 and 2017 seasons on 96 uniform in vigour 10 -years old Superior grapevines grown at El- Hawarta village, Minia district, Minia Governorate. The texture of soil is clay. Cane pruning system with using Gable supporting method was adopted. Vine load was 72 eyes (6 fruiting canes x 10 eyes + 6 renewal spurs x two eyes). The vines are planted at 2 x 3 meters (700 vines / fed.) Surface irrigation system using Nile water was followed.

1. Soil analysis:

Soil is classified as clay in texture with water table depth not less than two meters deep. Mechanical, physical and chemical analysis of the tested soil at 0.0

- 90 cm depth were carried out at the start of the experiments according to the procedures that outlined by **Wilde *et al.*, (1985)** are given in **Table (1)**.

2- Common Horticultural practices:

Except those dealing with the present treatments (plant extracts and salicylic acid treatments), all the selected vines (96 vines) received the usual horticultural practices which are common used in the vineyard including the application of $20m^3$ F.Y.M. (0.25% N, 0.4 % P_2O_5 and 1.4 % K_2O), 150 kg ammonium nitrate (33.5 N), 200 kg triple calcium superphosphate (37.5 % P_2O_5) and 200 kg potassium sulphate (48% K_2O) per one feddan. Farmyard manure (F.Y.M.) was added once at the middle of Jan. Ammonium nitrate was splitted into three unequal batches and applied as 40% at growth start (1^{st} week of Mar.) 30 % just after berry setting and 30% three weeks later. Phosphate fertilizer was divided into two equal batches, the first with F.Y.M. (Mid. Jan.) and the second one just after berry setting (1^{st} week of May). Potassium fertilizer was divided into two equal batches and added at the first bloom (last week of March) and again immediately after berry setting (1^{st} week of May). Other horticultural practices such as irrigation, hoeing and pest management were carried out as usual.

Table (1): Analysis of the tested soil:

Constituents	Values
Particle size distribution	
Sand %	4.2
Silt %	24.3
Clay %	71.5
Texture	Clay
pH (1: 2.5 extract)	7.3
EC (1: 2.5 extract) mmhos/ 1 cm 25^{o}cm	0.74
Total CaCO3 %	1.80
O.M. %	1.92
Total N %	0.09
P ppm (Oslen)	5.0
K ppm (ammonium acetate)	612.0
Mg (ppm)	6.2
Available micronutrients (EDTA, ppm):	
Fe	4.0
Zn	3.2
Mn	5.5

3- Experimental work:

The present experiment included the following sixteen treatments from rocket and fenugreek seed sprouts, turmeric extract and salicylic acid:

1- Control (untreated trees).
2- Spraying rocket seed sprout at 0.05%.
3- Spraying rocket seed sprout at 0.1%.
4- Spraying Rocket sprout at 0.2%.
5- Spraying salicylic acid at 100 ppm
6- Spraying salicylic acid at 200 ppm
7- Spraying salicylic acid at 400 ppm.
8- Spraying turmeric extract at 0.05%
9- Spraying turmeric extract at 0.1%
10- Spraying turmeric extract at 0. 2%
11- Spraying fenugreek seed sprout at 0.05%
12- Spraying fenugreek seed sprout at 0.1%
13- Spraying fenugreek seed sprout at 0.2%
14- Spraying salicylic at 200 ppm.+ rocket seed sprout at 0.1%
15- Spraying salicylic at 200 ppm.+ turmeric extract at 0.1%
16- Spraying salicylic at 200 ppm.+ fenugreek seed sprout at 0.1%

Each treatment was replicated three times, two vines / each. The selected vines were sprayed three times with the investigated three plant extracts and salicylic acid at the growth start (1^{st} week of March.), just after berry setting (middle of April), and 21 days after berry setting (first week of May). Extracts of the two seed sprouts namely rocket and fenugreek were prepared by germinating of the seeds and when the plant height reached ten cm, they were harvested and put in the refrigerator at C0 till use. As the time of application they were blended in electric blinder. Salicylic acid at the assigned amounts was dissolved in ethyl alcohol and the pH of solution was adjusted to 6.5 with NaOH. Triton B as a wetting agent was added to all plant extract solutions at 0.05 % and spraying was done till runoff (5 L water/ vine). The untreated vines received water containing Triton B.

Analysis of fenugreek and rocket seed sprouts and turmeric extract are given in Tables (2 & 3 & 4)**.**

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 Turmeric

Compounds	Values
β- Bisabolene %	1.3
1.8-Cineol %	2.4
p-Cymene %	3.0
p-Cymen-8-ol %	0.3
Tr-Curcumin%	6.3
Curlone %	10.6
Dehydrocurcumin %	2.2
Myrcene	0.1
α-Phellandrene %	0.1
β- Phellandrene %	Tr
α- Pinene %	0.1
β -Pinene%	Tr
Terpinolene %	0.3
Tr-Turmerone %	31.1
Turmerone %	10.0
Ascorbic acid (mg)	50.0
ASH (g)	6.8
Calcium (g)	0.2
Carbohydrate (g)	69.9
Fat (g)	8.9
Food energy (k Cal)	390.0
Iron (g)	47.5
Niacin (mg)	4.8
Potassium (mg)	200.0
Phosphorus (mg)	260.0
Protein (g)	8.5
Riboflavin (mg)	0.19
Sodium (mg)	30.0
Thiamine (mg)	0.09
Water (g)	6.0

4- Experimental design:

A randomized complete block design was followed where this experiment included sixteen treatments each replicated three times, two vines per each.

5- Differential measurements:

During the two seasons, the following measurements were recorded:

5-1 Measurements of vegetative growth characteristics:

At the middle of June, twenty mature leaves from the opposite side to the basal clusters on the shoots were picked for calculating the leaf area using the following equation outlined by **Ahmed and Morsy (1999)**.

Leaf area ($cm^{2)}$ = 0.45 (0.79 x diameter 2) + 17.77.

The average leaf area was recorded. Average main shoot length (cm) was recorded as a result of measuring the length of ten shoots per vine (cm) and the average shoot length was recorded. Number of leaves per shoot was also recorded. Dynamic of wood ripening coefficient was calculated by dividing the length of the ripened part of shoot that had brownishedcolour by the total length of the shoots (green colour) in the ten shoots/ vine (middle of Oct.) according to **Bouard (1966)**. Weight of pruning's (kg.)/ vine was recorded just after carrying out pruning by weighing the removal one year old wood (1^{st} week of Jan.). Average cane thickness (cm) was estimated in the five basal internodes of the ten canes per vine by using a Vernier caliper.

5-2. Measurements of leaf photosynthetic pigments:

Plant pigments namely chlorophylls a & b and carotenoids were determined as (mg/1 g F.W.). Samples of five mature and fresh leaves from those leaves opposite to the basal clusters on each main shoot were taken on the last week of May in both seasons. The fresh leaves were cut into small pieces and 0.50 g weight from each sample was taken, homoyenized and extracted by 25% acetone in the presence of little amount of Na_2CO_3 and silica quartz, then filtered through central glass funnel G4. The residue was washed several times with acetone until the filtrate became colorless. The extract was completed to a known volume (20 ml) with 85% acetone. A portion of this extract was taken for the colormetric determination of pigments. Acetone (85% v/u) was used as a blank (according to **Fadle and Seri El- Dean, 1978**).

The optical density of the filtrate was determined using Carl Zeis spectrophotometer at the wave length of 662, 644 and 440 nm to determine chlorophylls a & b and totals carotenoids, respectively. Content of each pigment was calculated by using the following equation (according to **Von- Wettstein, 1957 and**

Hiscox and Isralstam, 1979)

Chl.A = (9.784 – E 662) – (0.99- E 644) = mg/L

Chl.B = (21.426- E 644) – (4.65 x E 662) = mg/L

Total carotenoids (4.965 x E440 – 0.268 (chlorophyll a + chlorophyll b)

E = optical density at a given wave length. These plant pigments were calculated as mg /100 g. F.W.

5-3 Measurements of leaf content of N, P, K, Mg, Zn, Fe and Mn:

Twenty leaves picked form those opposite to the basal clusters (According to **Summer, 1985**) for each vine were taken at the first week of June in both seasons. Blades and petioles of leaves were separated where blades were discarded and petioles were saved for determining of the different nutrients. Petioles were oven dried at 70°C and grounded then 0.5 g weight of each sample was digested using H_2SO_4 and H_2O_2 until clear solution was obtained (**Wilde *et al.*, 1985**). The digested solutions were quantitatively transfer to 100 ml volumetric flask and completed to 100 ml by distilled water. Thereafter, leaf contents of N, P, K and Mg (as percentages) and Zn, Fe and Mn (as ppm) for each sample were determined as follows:

1- Nitrogen % was determined by the modified microkjeldahle method as described by **Horneck and Miller (1998)**.

2- Phosphorus % was determined by using Olsen method as reported by **Cottenie *et al.*, (1982)**.

3- Potassium % was Flame photometrically determined using the method outlined by **Cottenie *et al.*, (1982)**.

4- Magnesium % was determined by using titration against EDTA using the method outlined by **Wilde *et al.*, (1985)**.

5- The three micronutrients namely Zn, Fe and Mn were determined using the atomic absorption apparatus spectrophotometer (**A.O.A.C. 2000**).

6- Statistical analysis:

All the obtained data were tabulated and statistically analyzed using New L.S.D at 5% for made all comparisons among the investigated treatment means (according to **Snedecor and Cochran, 1972 and Mead *et al.*, 1993**).

3. Results and Discussion:

1-Vegetative growth characteristics:

It is clear from the obtained data in Table (5) that treating Superior grapevines three times with fenugreek and rocket seed sprouts and turmeric extract at 0.05 to 0.2% and/or salicylic acid at 100 to 400 ppm significantly stimulated the six growth traits namely main shoot length, number of leaves/shoot, leaf area, wood ripening coefficient, pruning wood weight and cane thickness relative to the control. The stimulation on these growth aspects was significantly related to the application of rocket seed sprout, salicylic acid (SA), turmeric extract and fenugreek seed sprout, in ascending order. There was a gradual and significant stimulation on these growth traits namely main shoot length, number of leaves/shoot, leaf area, wood ripening coefficient, pruning wood weight and cane thickness with increasing concentrations of rocket and fenugreek seed sprouts and turmeric extract from 0.05 to 0.2% and salicylic acid from 100 to 400 ppm. However, meaningless promotion was occurred on these growth parameters among the higher two concentrations of rocket and fenugreek seed sprouts and turmeric extract from 0.1 to 0.2% and salicylic from 200 to 400 ppm. Combined applications of SA plus rocket, fenugreek seed sprouts and turmeric extract was significantly favourable than using each material alone in enhancing these growth aspects. Using SA at 200 ppm + rocket seed sprout at 0.1%, SA at 200 ppm+ fenugreek seed sprout at 0.1%, in ascending order gave the highest values of these growth characteristics. The maximum values of main shoot length **(130.3 & 130.5 cm)**, number of leaves/shoot **(33.0 & 33.0 leaf)**, leaf area **(133.3 & 131.9 cm^2)**, wood ripening coefficient **(0.99 & 0.99)**, pruning wood weight **(3.70 & 3.85 kg)** and cane thickness **(1.79 & 1.75 cm)** were recorded on the vines that received SA at 200 ppm+ fenugreek seed sprout at 0.1% during both seasons, respectively. The untreated vines received produced the lowest values. These results were true during both seasons.

2- Leaf chemical composition:

It is obvious from the obtained data in Tables (6 & 7) that spraying Superior grapevines with fenugreek and rocket seed sprouts and turmeric extract at 0.05 to 0.2% and salicylic acid at 100 to 400 ppm either alone or in combinations was significantly very essential in enhancing chlorophylls a & b, total carotenoids, N, P, K, Mg, Zn, Fe and Mn in the leaves relative to the control. Using rocket seed sprout, SA, turmeric extract and fenugreek seed sprout, in ascending order was significantly favourable in enhancing the leaf chemical components. There was a gradual and significant promotion on these pigments and nutrients with increasing concentrations of rocket and fenugreek seed sprouts, turmeric extract and salicylic acid. Increasing concentrations of rocket and fenugreek seed sprouts, turmeric extract from 0.1 to 0.2% and SA from 200 to 400 ppm failed to show significant promotion on these leaf chemical components. Combined applications of SA with any one of the three plant extracts at the medium concentrations were significantly superior than using each material alone. Treating the vines three times with a mixture of SA at 200 ppm+ fenugreek seed sprout at 0.1 % gave the maximum values of chlorophyll a **(4.49 & 4.55 mg/1.0 g FW)**, chlorophyll

b **(1.71 & 1.31 mg/1.0 g FW)**, total carotenoids **(1.67 & 1.69 mg/1.0 g FW)**, N **(2.39 & 2.34%)**, P **(0.53 & 0.51%)**, K **(1.66 & 1.59 %),** Mg **(1.14 & 1.06 %)**, Zn **(86.3 & 86.0 ppm),** Fe **(88.0 & 89.3 ppm)** and Mn **(94.0 95.9 ppm)** during both seasons, respectively. The minimum values of these plant pigments and nutrients were observed on the vines received N completely via inorganic N. These results were true during both seasons. A mixture of SA at 200 ppm+ turmeric extract at 0.1 % occupied the second position in this respect. The untreated vines produced the lowest values of these chemical components. These results were true during both seasons.

Table (5): Effect of single and combined applications of salicylic acid and some plant extracts on some growth aspects of Superior grapevines during 2016 and 2017 seasons

Treatments	Main shoot length (cm.)		Number of leaves/shoot		Leaf area (cm^2)		Wood ripening coefficient		Pruning wood weight / vine (kg.)		Cane thickness (cm)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Control.	109.0	106.9	14.0	13.0	107.3	106.9	0.66	0.61	1.39	1.35	0.94	0.95
Spraying rocket sprout at 0.05%	111.0	111.6	16.0	15.0	110.0	110.3	0.71	0.66	1.59	1.61	1.00	1.01
Rocket sprout at 0.1%	113.0	113.7	17.0	15.0	112.1	112.4	0.76	0.71	1.79	1.80	1.06	1.07
Rocket sprout at 0.2%	113.3	114.0	17.0	15.0	112.3	112.5	0.77	0.71	1.80	1.81	1.07	1.09
Salicylic acid at 100 ppm.	115.0	115.6	19.0	17.0	114.2	114.6	0.82	0.76	2.00	2.02	1.14	1.16
Salicylic acid at 200 ppm.	116.7	117.3	20.0	18.0	116.0	116.5	0.86	0.81	2.35	2.37	1.20	1.21
Salicylic acid at 400 ppm.	117.0	118.0	20.0	18.0	116.3	116.8	0.87	0.82	2.36	2.38	1.21	1.22
Turmeric extract at 0.05%	119.0	119.5	22.0	21.0	118.2	118.5	0.91	0.87	2.56	2.57	1.27	1.29
Turmeric extract at 0.1%	120.9	121.6	23.0	22.0	120.0	120.4	0.92	0.88	2.70	2.71	1.34	1.36
Turmeric extract at 0. 2%	121.0	122.0	23.0	22.0	120.6	121.0	0.93	0.88	2.71	2.72	1.35	1.37
Fenugreek sprout at 0.05%	123.3	124.0	25.0	25.0	122.3	122.6	0.97	0.93	2.91	2.92	1.44	1.46
Fenugreek sprout at 0.1%	125.0	125.9	26.0	26.0	124.9	125.3	0.97	0.94	3.12	3.13	1.51	1.50
Fenugreek sprout at 0.2%	125.3	126.0	26.0	26.0	125.0	125.4	0.97	0.95	3.13	3.14	1.52	1.51
Salicylic at 200 ppm.+ rocket at 0.1%	127.1	128.0	29.0	29.0	127.1	127.5	0.99	0.99	3.40	3.46	1.67	1.62
Salicylic at 200 ppm.+ turmeric at 0.1%	129.2	130.0	31.0	31.0	129.1	130.0	0.99	0.99	3.55	3.66	1.72	1.70
Salicylic at 200 ppm.+ fenugreek at 0.1%	130.3	130.5	33.0	33.0	133.3	131.9	0.99	0.99	3.70	3.85	1.79	1.75
New L.S.D. at 5%	**1.1**	**1.3**	**2.0**	**2.0**	**1.4**	**1.6**	**0.04**	**0.05**	**0.14**	**0.16**	**0.05**	**0.04**

Table (6): Effect of single and combined applications of salicylic acid and some plant extracts on chlorophylls a & b, total carotenoids (mg/1 g FW) and percentages of N, P and K in the leaves of Superior grapevines during 2016 and 2017 seasons

Treatments	Chlorophyll a (mg/1 g FW)		Chlorophyll b (mg/1 g FW)		Total carotenoids (mg/1 g FW)		Leaf N %		Leaf P %		Leaf K %	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Control.	4.11	4.04	1.12	1.09	1.05	1.00	1.51	1.49	0.11	0.09	1.11	1.06
Spraying rocket sprout at 0.05%	4.20	4.21	1.16	1.15	1.10	1.09	1.58	1.56	0.13	0.14	1.15	1.10
Rocket sprout at 0.1%	4.31	4.32	1.20	1.19	1.15	1.15	1.66	1.63	0.17	0.17	1.17	1.14
Rocket sprout at 0.2%	4.32	4.33	1.21	1.20	1.16	1.16	1.67	1.64	0.18	0.18	1.18	1.15
Salicylic acid at 100 ppm.	4.41	4.42	1.30	1.29	1.20	1.21	1.73	1.72	0.20	0.19	1.21	1.19
Salicylic acid at 200 ppm.	4.50	4.49	1.35	1.34	1.25	1.27	1.80	1.81	0.22	0.22	1.24	1.25
Salicylic acid at 400 ppm.	4.51	4.50	1.36	1.35	1.26	1.28	1.81	1.82	0.23	0.22	1.25	1.26
Turmeric extract at 0.05%	4.60	4.59	1.42	1.41	1.31	1.33	1.87	1.90	0.26	0.25	1.28	1.29
Turmeric extract at 0.1%	4.69	4.68	1.46	1.45	1.36	1.38	1.94	1.96	0.27	0.27	1.30	1.30
Turmeric extract at 0. 2%	4.70	4.71	1.47	1.46	1.37	1.39	1.95	1.97	0.28	0.28	1.31	1.31
Fenugreek sprout at 0.05%	4.79	4.81	1.52	1.51	1.42	1.44	2.02	2.04	0.30	0.29	1.37	1.36
Fenugreek sprout at 0.1%	4.90	4.94	1.56	1.55	1.47	1.49	2.10	2.10	0.32	0.31	1.41	1.40
Fenugreek sprout at 0.2%	4.91	4.95	1.57	1.56	1.48	1.50	2.11	2.11	0.33	0.32	1.42	1.41
Salicylic at 200 ppm.+ rocket at 0.1%	5.11	5.31	1.61	1.64	1.55	1.57	2.20	2.18	0.36	0.37	1.49	1.47
Salicylic at 200 ppm.+ turmeric at 0.1%	5.31	4.50	1.66	1.69	1.61	1.64	2.31	2.26	0.38	0.39	1.55	1.52
Salicylic at 200 ppm.+ fenugreek at 0.1%	5.49	4.55	1.71	1.73	1.67	1.69	2.39	2.34	0.38	0.51	1.66	1.59
New L.S.D. at 5%	**0.03**	**0.04**	**0.02**	**0.03**	**0.03**	**0.04**	**0.05**	**0.06**	**0.02**	**0.02**	**0.04**	**0.03**

Table (7): Effect of single and combined applications of salicylic acid and some plant extracts on the leaf content of Mg (as %) and Zn, Fe and Mn (as ppm) in the leaves of Superior grapevines during 2016 and 2017 seasons

Treatments	Leaf Mg %		Leaf Zn (ppm)		Leaf Fe (ppm)		Leaf Mn (ppm)	
	2016	2017	2016	2017	2016	2017	2016	2017
Control.	0.47	0.50	49.1	50.0	51.8	52.0	53.1	54.0
Spraying rocket sprout at 0.05%	0.52	0.54	52.1	52.6	53.0	52.9	56.1	56.9
Rocket sprout at 0.1%	0.56	0.59	55.1	55.6	59.1	58.8	59.0	60.0
Rocket sprout at 0.2%	0.57	0.60	55.6	56.0	60.2	59.1	59.9	60.3
Salicylic acid at 100 ppm.	0.64	0.65	59.0	58.9	63.0	62.9	63.3	64.0
Salicylic acid at 200 ppm.	0.70	0.69	62.0	61.9	66.0	65.9	66.3	68.0
Salicylic acid at 400 ppm.	0.71	0.70	62.4	62.0	66.3	65.9	67.0	68.0
Turmeric extract at 0.05%	0.76	0.76	66.0	65.9	70.0	69.8	70.0	70.9
Turmeric extract at 0.1%	0.80	0.81	68.4	68.3	73.0	72.7	73.3	74.0
Turmeric extract at 0. 2%	0.81	0.82	68.5	68.4	73.3	73.0	73.4	74.3
Fenugreek sprout at 0.05%	0.86	0.87	71.9	71.9	76.9	76.6	80.0	80.0
Fenugreek sprout at 0.1%	0.91	0.91	75.0	74.9	79.0	78.3	82.9	82.7
Fenugreek sprout at 0.2%	0.92	0.92	75.3	75.3	79.6	78.5	83.0	82.8
Salicylic at 200 ppm.+ rocket at 0.1%	0.98	0.96	79.0	78.8	82.0	81.9	87.0	88.0
Salicylic at 200 ppm.+ turmeric at 0.1%	1.05	1.01	84.0	83.9	85.3	85.0	91.0	92.0
Salicylic at 200 ppm.+ fenugreek at 0.1%	1.14	1.06	86.3	86.0	88.0	89.3	94.0	95.9
New L.S.D. at 5%	**0.03**	**0.04**	**1.9**	**2.1**	**2.2**	**2.3**	**2.4**	**2.6**

4. Discussion:

The use of natural products is horticultural practice instead of other synthetic chemical products is becoming a main target for many fruit crop species, where, the world markets has been growing rapidly in recent years for organic fruit production (**Dimitri and Oberholtzer, 2006**).

Recently, plant extracts are used for improving production and storability of grapes instead of using chemicals. The change for using plant extract against chemicals was performed because pathogens resistance to the fungicides has developed as well as for protecting our environment from pollution. The higher own content of these plant extracts from plant pigments, phenolic compounds and essential oils seem to have synergistic effects on the growth and yield of grapevines. (**Kirtikare and Basu, 1984, Maia *et al.*, 2014 and Dhekney, 2016**).

It is Vegetative part of turmeric, oleoresin and oil. The oleoresin is a mixture of compounds, namely curcumin volatile oil and other active ingredients, non- volatile fatty resinous material (**Govindarajan, 1980**). Turmeric contains 0.5 % volatile oil. This oil contains about 60% turmeric, 25% zingiberene and small quantities d- & - phellandrene, d-sabiene, cineole and forneol. Turmeric is valued mainly for its principle coloruing pigments, curcumin which imports the yellow clour to turmeric, besides nutritive constituents like potassium. The main colouring constituents of turmeric and other yellow *Curcuma* species are curcumins, demethoxycurumin, methane and bisdemethoxy curumin together make the colouring pigment in the turmeric rhizomes (**Peter, 1999**).

Germination and sprouting of different crop seed 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; Biommerson, 2007; Abdallah, 2008 and Anwar *et al.*, 2013)**.

Salicylic acid (SA) from latin salix willow trees is widely used in organic synthesis and function as a plant hormone. It is derived from the metabolism of salicin. It had the formula C_6H_4 (OH) COOH ($C_7H_6O_3$). It is a phenolic phytohormone and is found in plants with role in plant growth development, photosynthesis, transpiration as well as uptake and transport of nutrients. SA also induces specific changes in leaf anatomy and chloroplast structure. It is involved in endogenous signaling mediating in plant defense against pathogens. It is biosynthesized from the amino acids phenylalanine (**Taiz and Zeiger, 2002; Lobez- Delgado *et al.*, 2007; Hayat and Ahmed, 2007 and Joseph *et al.*, 2010**). There is increasing interest in the interactive role between salicylic acid and reactive oxygen species (ROS) and other plant signalling molecules in regulating cell death in plants. Initial evidence suggested that salicylic acid was a potent inhibitor of heme-containing enzymes such as catalase and ascorbate peroxidase thus capable of stimulating ROS

accumulation during various biotic and abiotic stress conditions. The mode of action of salicylic acid may in fact be related to its ability to prime the defense response by increasing the levels of various defense compounds. Salicylic acid was also proposed as both a potent inducer of NADPH oxidase and an inhibitor of the alternative oxidase thus capable of indirect regulation of the redox status of plant cells (**Hayat and Ahmed, 2007).**

The current results showed that the beneficial effects of crop seed sprouts on growth and vine nutritional status are in concordance with those obtained by **Ahmed and Gad El- Kareem (2014)**, **El-Khawaga and Mansonr (2014), Mohamed, (2014) Refaai (2014 a and b), Ahmed, (2015) Abd El-Rahman (2015), Ahmed and Habasy- Randa (2017), Allam (2017)** and **Masoud (2017),** turmeric extract **Ahmed *et al.,* (2014), Osman (2014), Uwakiem (2014), Shoug (2015), Ahmed (2016), Abdelaziz *et al*., (2017a), Abd El-Hafiz (2017), Ebrahim-Rehab (2017)**, **Zagzog and Saied (2017)** and **Ahmed-Fatma (2018)**, salicylic acid **El- Hanafy (2011)**, **El- Kady- Hanaa, (2011), Bondok - Sawsan *et al,* (2011), Mohamed - Ebtesam (2012), Gad El-Kareem and Abd El- Rahman (2013), Osman (2014), Abd El- Rady (2015)** and **Mohamed – Attiat,** (**2016**).

5. Conclusion:

For enhancing growth and vine nutritional status of Superior grapevines grown under Minia region and at the same time for reducing our environmental pollution, it is recommended to spray a mixture of salicylic acid at 200 ppm and fenugreek seed sprout at 0.1% at growth start, just after berry setting and three weeks later.

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