Yield and Berries Quality of Superior Grapevines As Influenced With Spraying Wheat Seed Sprout

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Abstract: This study was accomplished during 2016 and 2017 seasons to test the effect of treating Superior grapevines once, twice or thrice with wheat seed sprout at 0.5 to 4.0% on yield, shot berries% and berries quality. Subjecting the vines to wheat seed sprout once, twice or thrice at 0.5 to 4.0% was favourable in improving the yield and berries quality relative to the control. Percentage of shot berries in the clusters was measurably reduced with using wheat seed sprout treatments. The best results with regard to yield and berries quality of Superior grapevines grown under Minia region conditions were obtained due to exposing the vines twice with wheat seed sprout at 2.0%.
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1. Introduction:

Recently, various trials were performed for searching about the naturals such as crop seed sprouts used as substitutes for chemical amendments to protect our environment from pollution and also for producing vigour trees able to give higher yield and better berries quality.

Germination of crop seeds may facilitate the availability of most organic nutrients, amino acids, vitamins, antioxidants, proteins, fats and soluble sugars **(Cazuola *et al*., 2004; Cairney, 2005; Biommerson, 2007; Abdallah, 2008; Darwish, 2009; Anderson and Cedergreen, 2010; Al- Shereif *et al*., 2013 and El-Sayed-Faten, 2014**).

An announced promotion on the yield and quality of fruits was observed in various fruit crops due to using extract of crop seed sprouts **(Ahmed and Gad El- Kareem 2014**, **El-Khawaga and Mansonr, 2014, Mohamed, 2014, Refaai, 2014 a and 2014 b, Abd El-Rahman, 2015, Ahmed, 2015, Ahmed and Habasy- Randa, 2017, Allam, 2017** and **Masoud, 2017).**

The merit of this study was examining the effect of wheat seed sprouts on yield and berries quality of Superior grapevines.

2. Materials and Methods:

This study was carried out during 2016 and 2017 seasons on 78 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.

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

Table (1): Analysis of the tested soil:

Constituents	Values
Particle size distribution	
Sand %	4.0
Silt %	24.4
Clay %	71.6
Texture	Clay
pH (1: 2.5 extract)	7.2
EC (1: 2.5 extract) mmhos/ 1 cm 25°cm	0.72
Total CaCO3 %	1.78
O.M. %	2.00
Total N %	0.08
P ppm (Oslen)	5.1
K ppm (ammonium acetate)	615.0
Mg (ppm)	6.1
Available micronutrients (EDTA, ppm):	
Fe	4.2
Zn	3.1
Mn	5.5

Except those dealing with the present treatments (wheat seed sprouts), all the selected vines (78 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 (1st 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 (1st 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 (1st week of May). Other horticultural practices such as irrigation, hoeing and pest management were carried out as usual.

The present experiment included the following thirteen treatments from different concentrations and frequencies of application of wheat seed sprout:

1- Control (untreated trees).

2- Spraying wheat seed sprout at 0.05% once at growth start (1st week of March.).

3- Spraying wheat seed sprout at 0.05% twice at growth start (1st week of March.) and just after berry setting (middle of April).

4- Spraying wheat seed sprout at 0.05% thrice at growth start (1st week of March.) and just after berry setting (middle of April) and 21 days after berry setting (first week of May).

5- Spraying wheat seed sprout at 1.0 % once at growth start (1st week of March.).

6- Spraying wheat seed sprout at 1.0 % twice at growth start (1st week of March.) and just after berry setting (middle of April).

7- Spraying wheat seed sprout at 1.0 % thrice at growth start (1st week of March.) and just after berry setting (middle of April) and 21 days after berry setting (first week of May).

8- Spraying wheat seed sprout at 2.0 % once at growth start (1st week of March.).

9- Spraying wheat seed sprout at 2.0 % twice at growth start (1st week of March.) and just after berry setting (middle of April).

10- Spraying wheat seed sprout at 2.0 % thrice at growth start (1st week of March.) and just after berry setting (middle of April) and 21 days after berry setting (first week of May).

11- Spraying wheat seed sprout at 4.0 % once growth start (1st week of March.).

12- Spraying wheat seed sprout at 4.0 % twice at growth start (1st week of March.) and just after berry setting (middle of April).

13- Spraying wheat seed sprout at 4.0 % thrice at growth start (1st week of March.) and just after berry setting (middle of April) and 21 days after berry setting (first week of May).

Each treatment was replicated three times, two vines/ each. Extract of the wheat seed sprouts was 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. 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 wheat seed sprouts are given in Tables (2)**.**

Table 2: Chemical composition of wheat seed sprout

Constituent Values	(mg/ 100 g F.W.)
Aspartic acid	**3.0**
Arginine	**3.8**
Alanine	**3.0**
Glutamic acid	**5.0**
Thiamine (B_1)	**3.0**
Riboflavin (B_2)	**2.9**
Pyridoxine (N_6)	**2.0**
Vitamin E	**0.52**
Ca	**290**
P	**579**
K	**639**
Mg	**315**
Fe	**210**
Zn	**216**

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

During the two seasons, the following measurements were recorded:

1 Yield:

Harvesting took place when T.S.S/ acid ratio in the berries of the check treatment reached at least 25: 1 (at the middle of July in the three seasons) (according to **Weaver, 1976**). The yield of each vine was recorded in terms of weight (in kg.) and number of clusters per vine, and then the average weight of cluster was recorded (g.)

2- Berries quality:

Five clusters from each vine were taken at random for determination of the following physical and chemical characteristics of the berries:-

1. Shot berries.
2. Cluster dimensions (length and shoulder, cm.).
3. Average berry weight (g).
4. Average berry dimensions (longitudinal and equatorial, in cm).
5. Percentage of total soluble solids in the juice by using handy refractometer.
6. Percentage of reducing sugars in the juice by

Lane and Eynon (1965) volumetric method as described in **A.O.A.C. (2000).**

7. Percentage of total acidity (as g tartaric acid/ 100 ml juice) by titration against 0.1 NaOH using phenolphthalein as an indicator **A.O.A.C. (2000).**

8. The ratio between total soluble solids and acid.

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- Yield/ vine:

It is evident from the obtained data in Table (3) that subjecting the vines to wheat seed sprout once, twice or thrice at 0.5 to 4.0% had significant promotion on the yield expressed in weight (kg) and number of clusters/vine relative to the control treatment. Significant differences on the yield were observed among all concentrations and frequencies of application of wheat seed sprout except among the higher two concentrations (2.0 & 4.0%) and frequencies (twice & thrice). Therefore, from economical point of view, it is necessary to use wheat seed sprout at 2.0 % twice. Under such promised treatment, yield/vine reached **12.5 and 17.1 kg**. The yield of the untreated vines reached **9.1 and 9.5 kg** during both seasons, respectively. The percentage of increment on the yield due to using the promised treatment above the control treatment reached **38.9 and 92.2%** during both seasons, respectively. Number of clusters per vine in the first season of study was significantly unaffected by wheat seed sprout treatments. These results were true during both seasons.

2- Cluster weight and dimensions:

It is revealed from the obtained data in Table (3) that supplying the vines with wheat seed sprout at 0.5 to 4.0% once, twice or thrice significantly was followed by improving weight, length and shoulder of cluster compared to the control treatment. The promotion was associated with increasing concentrations and frequencies of application of wheat seed sprout. No significant promotion was observed on weight and dimensions of cluster with increasing concentrations of wheat seed sprout from 2.0 to 4.0% and frequencies of application from twice to thrice. The maximum values of cluster weight **(484.0 % 491.0 g)**, length **(19.8 & 20.3 cm)** and shoulder **(15.1 & 14.7 cm)** were recorded on the vines that treated with wheat seed sprout at 4.0% thrice, during both seasons respectively. The untreated vines produced the lightest clusters. These results were true during both seasons.

3- Percentage of shot berries:

It is noticed from the obtained data in Table (4) that percentage of shot berries was significantly controlled by using wheat seed sprout once, twice or thrice at 0.5 to 4.0% rather than non- application. There was a gradual reduction on the percentage of shot berries with increasing concentrations (from 0.5 to 4.0%) and frequencies of application of wheat seed sprout from once to thrice. insignificant reduction on the percentage of shot berries was observed among the higher two concentrations of wheat seed sprout namely 2.0 and 4.0% as well as among the higher frequencies of application namely twice and thrice. Therefore, from economical point of view, it is desired to used wheat seed sprout at 2.0% twice. Under such promised treatment (2.0% twice), shot berries % reached **5.5 and 5.0%,** during both seasons respectively. Shot berries % in the untreated vines reached **11.1 and 10.1** during 2016 and 2017 seasons, respectively. These results were true during both seasons.

4- Quality of the berries:

One can state that from the obtained data in Tables (4 & 5) that varying concentrations and frequencies of application of wheat seed sprout had significant effect on all quality parameters. Treating the vines with wheat seed sprout once, twice or thrice at 0.5 to 4.0 % has very effective in improving quality parameters of the berries in terms of increasing beery weight and dimensions (longitudinal and equatorial), T.S.S.%, reducing sugars %, T.S.S/acid and decreasing total acidity% relative to the control treatment. The promotion on berries quality was in proportional to the increase in both concentrations and frequencies of application of wheat seed sprout. Increasing concentrations of wheat seed sprout from 2.0 to 4.0 % and frequencies of application from twice to thrice had meaningless promotion on all quality parameters. The best results with regard to quality of the berries were obtained due to treating the vines twice with wheat seed sprout at 2.0 % (since no significant promotion on quality of the berries was detected among the higher two concentrations and frequencies of application). Untreated vines produced unfavorable effects on quality of the berries. Similar trend was noticed during both seasons.

4. Discussion:

However, 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**).

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 isolcucin, vitamins A, B & B_2 & B_6, 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 carbohydras and plant pigments (**Camacho *et al.*, 1992; Abdallah *et al.*, 2000; Crews and Peoples, 2004; Cazuola *et al.*, 2004; Cairney, 2005; Biommerson, 2007; Abdallah, 2008; Darwish, 2009; Anderson and Cedergreen, 2010; Al- Shereif *et al.*, 2013 and El-Sayed-Faten, 2014**).

Table (3): Effect of different concentrations and frequencies of application of wheat seed sprout on the percentage of berry setting, yield and cluster aspects of Superior grapevines during 2016 and 2017 seasons

Treatments	No. of. Clusters/ vine		Yield/vine (kg)		Average cluster weight (g)		Cluster length (cm)		Cluster shoulder (cm)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Control (untreated trees)	25.0	25.0	9.0	9.1	360.0	362.0	16.0	16.1	11.0	11.1
Spraying wheat seed sprout at 0.05% once	25.0	27.0	9.5	10.3	381.0	383.0	16.4	16.6	11.5	11.6
Spraying wheat seed sprout at 0.05% twice	25.0	29.0	10.0	11.7	401.0	404.0	16.7	17.2	12.1	12.2
Spraying wheat seed sprout at 0.05% thrice	26.0	29.0	10.5	11.7	402.0	405.0	16.7	17.3	12.2	12.3
Spraying wheat seed sprout at 1.0 % once	26.0	31.0	10.9	13.2	421.0	425.0	17.3	18.0	12.8	13.0
Spraying wheat seed sprout at 1.0 % twice	26.0	33.0	11.5	14.7	441.0	446.0	18.0	18.8	13.1	13.4
Spraying wheat seed sprout at 1.0 % thrice	26.0	33.0	11.5	14.7	441.0	446.0	18.0	18.9	13.2	13.5
Spraying wheat seed sprout at 2.0 % once	26.0	34.0	12.0	15.8	461.0	466.0	18.8	19.6	14.0	14.0
Spraying wheat seed sprout at 2.0 % twice	26.0	35.0	12.5	17.1	481.0	489.0	19.6	20.1	14.9	14.5
Spraying wheat seed sprout at 2.0 % thrice	26.0	35.0	12.5	17.2	482.0	490.0	19.7	20.2	15.0	14.6
Spraying wheat seed sprout at 4.0 % once	26.0	35.0	12.0	16.3	462.0	467.0	18.9	19.7	14.0	14.1
Spraying wheat seed sprout at 4.0 % twice	26.0	37.0	12.6	18.1	483.0	490.0	19.7	20.2	15.0	14.6
Spraying wheat seed sprout at 4.0 % thrice	26.0	37.0	12.6	18.2	484.0	491.0	19.8	20.3	15.1	14.7
New L.S.D. at 5%	**NS**	**2.0**	**0.4**	**0.4**	**15.5**	**16.0**	**0.3**	**0.3**	**0.3**	**0.3**

Table (4): Effect of different concentrations and frequencies of application of wheat seed sprout on the percentage of shot berries as well as berry weight and dimensions of Superior grapevines during 2016 and 2017 seasons

Treatments	Shot berries %		Average berry weight (g)		Average berry longitudinal (cm)		Average berry equatorial (cm)	
	2016	2017	2016	2017	2016	2017	2016	2017
Control (untreated trees)	11.1	10.1	5.00	5.25	2.11	2.15	1.80	1.83
Spraying wheat seed sprout at 0.05% once	10.5	9.5	5.22	5.50	2.16	2.21	1.87	1.90
Spraying wheat seed sprout at 0.05% twice	9.1	9.0	5.50	5.75	2.21	2.26	1.95	1.99
Spraying wheat seed sprout at 0.05% thrice	8.9	8.8	5.51	5.76	2.22	2.28	1.89	2.00
Spraying wheat seed sprout at 1.0 % once	8.0	8.0	5.75	6.00	2.29	2.35	2.00	2.05
Spraying wheat seed sprout at 1.0 % twice	7.0	6.8	6.00	6.23	2.34	2.40	2.06	2.10
Spraying wheat seed sprout at 1.0 % thrice	6.5	6.6	6.03	6.24	2.35	2.41	2.07	2.11
Spraying wheat seed sprout at 2.0 % once	6.0	5.8	6.60	6.63	2.41	2.44	2.15	2.22
Spraying wheat seed sprout at 2.0 % twice	5.5	5.0	6.90	6.94	2.44	2.51	2.30	2.33
Spraying wheat seed sprout at 2.0 % thrice	5.4	4.9	6.91	6.95	2.47	2.52	2.31	2.34
Spraying wheat seed sprout at 4.0 % once	5.9	5.7	6.63	6.64	2.42	2.46	2.16	2.23
Spraying wheat seed sprout at 4.0 % twice	5.3	4.9	6.95	6.95	2.47	2.51	2.32	2.34
Spraying wheat seed sprout at 4.0 % thrice	5.7	4.6	6.96	6.96	2.48	2.52	2.33	2.35
New L.S.D. at 5%	**0.4**	**0.5**	**0.14**	**0.15**	**0.04**	**0.05**	**0.06**	**0.05**

Table (5): Effect of different concentrations and frequencies of application of wheat seed sprout on some chemical parameters of the berries of Superior grapevines during 2016 and 2017 seasons.

Treatments	T.S.S %		Reducing sugars %		Total acidity %		T.S.S/acid	
	2016	2017	2016	2017	2016	2017	2016	2017
Control (untreated trees)	17.7	18.0	15.1	15.5	0.705	0.714	25.1	25.2
Spraying wheat seed sprout at 0.05% once	18.1	18.5	15.5	16.1	0.680	0.685	26.6	27.0
Spraying wheat seed sprout at 0.05% twice	18.6	19.0	16.0	16.6	0.659	0.665	28.2	28.6
Spraying wheat seed sprout at 0.05% thrice	18.7	19.0	16.0	16.7	0.657	0.664	28.5	28.6
Spraying wheat seed sprout at 1.0 % once	19.1	19.4	16.7	17.2	0.637	0.640	30.5	30.3
Spraying wheat seed sprout at 1.0 % twice	19.6	19.8	17.5	17.7	0.611	0.620	32.1	31.9
Spraying wheat seed sprout at 1.0 % thrice	19.7	19.9	17.6	17.8	0.603	0.620	32.7	32.1
Spraying wheat seed sprout at 2.0 % once	20.4	20.5	18.1	18.3	0.580	0.585	35.2	35.0
Spraying wheat seed sprout at 2.0 % twice	21.0	21.0	18.7	18.8	0.560	0.564	37.5	37.2
Spraying wheat seed sprout at 2.0 % thrice	21.1	21.2	18.8	19.0	0.560	0.563	37.7	37.7
Spraying wheat seed sprout at 4.0 % once	20.5	20.6	18.2	18.4	0.580	0.584	37.1	35.3
Spraying wheat seed sprout at 4.0 % twice	21.1	21.1	18.8	19.0	0.557	0.563	37.9	37.5
Spraying wheat seed sprout at 4.0 % thrice	21.2	21.3	18.9	19.0	0.557	0.561	38.1	38.0
New L.S.D. at 5%	**0.3**	**0.3**	**0.3**	**0.3**	**0.012**	**0.013**	**0.6**	**0.5**

Camacho *et al.* (1992), Cairney (1995); Aballah *et al* (2000) and Crews and Peoples (2004) found that foliar application of crop seed sprouts such as barley, wheat, fenugreek and rocked had an obvious promotion on growth and vine nutritional status through supplying the plants with their requirements from organic and mineral nutrients, natural hormones and antioxidants and they are responsible for reducing reactive oxygen species consequently protecting plan cells from death.

The current results regarding the beneficial effects of crop seed sprouts on yield and berries quality 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), Ibrahim- Asmaa, (2017)** and **Masoud (2017).**

5. Conclusion:

The best results with regard to yield and berries quality of Superior grapevines grown under Minia region conditions were obtained due to exposing the vines twice with wheat seed sprout at 2.0%.

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