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Response of Flame Grape Vine in Sandy Soil to Foliar Application of Sulphur

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Abstract: The effect of using one, two, three or four sprays of elemental sulphur 0.0, 0.20,0.40,0.80 or 2.0% on the leaf area, length of shoots, leaf NPKS, berry set%, yield as well as physical and chemical properties of the berries of flame vines grown under sandy soil was studied during 2004 and 2005 seasons. Results showed that spraying elemental sulphur at 0.20 to 2.0% once, twice, three or four times caused a remarkable stimulation on growth characters, leaf N and S, berry set percentage, yield as well as fruit quality parameters compared to unsparing. The promotion occurred was associated with increasing concentrations and number of sprays the elemental Sulphur. Leaf content of P and K as well as the total acidity percentage in the juice tended to reduce with sulphur treatments. No measurable influence on the investigated Parameters was revealed due to raising concentration above 0.80% and number of sprays from three to four sprays. The best results with regard to yield and quality of berriers were obtained when flame vines received three sprays of elemental sulphur at 0.80%.

Key words: Flame, grapes, sulphur, yield, berry set, leaf area, acidity, fruit quality

INTRODUCTION

An insufficient sulphur supply reduced not only crop yield but also has a strong impact on crop quality as for instance the content and composition of proteins. The sulphur supply also influences the uptake of other nutrients, especially nitrogen. Under conditions of sulphur deficiency, the nitrogen utilization is reduced and thus losses of N to atmosphere and groundwater are promoted. Besides this, the resistance of crops to certain plant diseases is linked to their sulphur supply. Numerous sulphur fertilizers are available for either soil or foliar application in sulphate or elemental form. Sulphur applications were responsible for correcting several soil problems in arid and semi arid region, reducing soil PH and salt accumulation and increasing nutrients availability[1,2]. Sulphur fertilization for fruit orchards is not common in Egypt and most growers use sulphur as insecticides and fungicides only. Due to the increase in the application of sulphur free fertilizers as well as the reduction of using insecticides and fungicides for reducing pollution, the fruit trees begin to suffer from the decline of sulphur in soil[3,4]. The various benefits of using sulphur as an essential as well as an absent and present macronutrient for growth, nutritional status of the trees, flowering, fruit setting, yield and fruit quality are emphasized the necessity of using such promising element for fertilizing flame vines grown under sandy soil[5-7]. Previous studies confirmed the various benefits of using sulphur on growth, vine nutritional status, berry set%, yield as well as physical and chemical properties of the berries in various grapevine cultivars[8-14]. This study aimed to highlight the effect of concentrations and number of sprays of sulphur on growth, leaf N,P,K,S, berry set percentage, yield as well as quality of berries of flame vines grown in sandy soil.

MATERIAL AND METHODS

This experiment was conducted during 2004 and 2005 seasons on one hundred and twenty grapevines of Flame seedless cultivar vines were selected to be as uniform as possible in vigour and grown in a private vineyard situated at Nobaria, Beheira Governorate. The vines were eight-year-old, planted in sandy soil, spaced at 1.75 × 2.5 meters, double cardon trained system and irrigated by surface irrigation system. The data of soil analysis according to[15] are shown in Table 1. Winter pruning was established at the first week of January in both seasons vine load was 68 buds (14 fruiting spurs X 4 buds plus 6 replacement spurs X 2 buds).

Table 1: Analysis of vineyard soil.

Sand %	80.0
Silt %	8.9
Clay%	11.1
Texture	sandy
O.M %	0.24
PH	0.75
EC dsm-1)	7.79
Total $CaCo_3$%	8.00
Total N%	0.012
Available P ppm, Olsen)	4.2
Available K ppm, ammonium acetat)	103.5
So_4 soluble me / 1009)	1.0

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This experiment included two factors A and B). The first factor A) included the following five concentrations of sulphur:

1 0.0%
2 0.20%
3 0.40%
4 0.8%
5 2.0%

While, the second factor B) assigned the four treatments according to the number of sulphur sprays which were:

1 once
2 twice
3 three times
4 four times

Therefore, the experiment involved twenty various treatments. A completely randomized blocks design in a split-plot arrangement was followed in the experiment-Every treatment was done on the same vines in the two seasons. Each treatment was replicated three times, two vines per each. The five concentrations of sulphur occupied the main plots while the four number of sulphur sprays ranked the subplots. Spraying of sulphur was done as follows according to the number of applications.

- Once at growth start (2nd week of March).
- Twice at the same previous date and just before boom (1st week of April)
- Three times at the same two previous dates and immediately after berry setting (first week of May)
- Four times at the same three previous dates and at two weeks later (3rd week of May)

A surfactant namely triton B was added to all spraying solutions including 0.0% sulphur control) at 0.1%-The vines were sprayed with sulphur solutions till runoff 1.5l/vine). Horticultural practices except the addition of sulphur were used as usual. Potential effects of sulphur were evaluated in terms of the change in growth, vine nutritional status, berry set percentage, yield and berries quality. Average shoot length cm) was recorded t the middle of June-Average leaf area $cm)^2$ of the twenty leaves sample from those opposite to the basal clusters was calculated according to[16] method using the formula. LA = 0.56 0.79 Xw^2) + 20.01, where LA= leaf area cm), W = the maximum leaf width cm).

Percentages of N, P, K and S on dry weight basis) were determined in petioles of the selected leaves according to[15]-Berry set % was recorded by dividing the number of developed and attached berries by the total number of flowers per cluster, number of attached berries plus dropped fruitless in the five selected clusters. Harvesting date was registered when T.s.s/Acidity reached 25:1 when such ratio reached 25:1 for the control berries in vines received 0.0% sulphur) harvesting was carried out for all treatments. Yield expressed in weight Kg) and number of cluster per vine was recorded. Five clusters were taken at random for determination of average berry weight g), total soluble solids%, total acidity% (expressed as g tartaric acid/100ml juice), total soluble solids/total acidity and total sugars% According to Association of Official Agricultural Chemists[17]). All the obtained data were tabulated and statistically analyzed according to[18] using new L.S D test.

RESULTS AND DISCUSSION

Effect of sulphur on shoot length and leaf area: Data in Tables 2 and 3) clearly show that using sulphur at 0.20 to 2.0% significantly improved the shoot length and leaf area compared with check treatment. The increase was positively associated with the increase in concentrations of sulphur. However, sulphur concentration at 0.20 failed to show any measurable promotion on such two growth traits. The maximum values were detected on vines

Table 2: Effect of concentrations and number of sprays elemental sulphur on the average shoots length cm) of flame vines in 2004 and 2005 seasons.

	Number of sprays B)									
	2004					2005				
Sulphur conc. A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	95.2	101	107.3	108	102.9	99.1	106.3	113.1	114.2	108.2
0.2	98.3	105.1	111	112	106.6	108.1	115	122.3	123	117.1
0.4	105.1	111	117	118.3	112.9	116.3	122	129	130.1	124.4
0.8	113	120.1	130	131	123.5	124.3	131.3	145.3	146	136.7
2	114.3	121	131	133	124.8	125.1	132	146	147.7	137.7
Mean (B)	105.2	111.6	119.3	120.5		114.6	121.3	131.1	132.2	
L.S D at 5%	A 5.0		B 4.3		AB 9.6	A 6.2		B 5.0		AB 11.2

Table 3: Effect of concentrations and number of sprays elemental sulphur on the leaf area cm) of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	110.1	116.2	122	123	117.8	111	115.7	120.1	121	117
0.2	116.2	123	130	131	125.1	115.7	121.2	126.1	126.9	122.5
0.4	122.3	129.1	136.3	137	131.2	121	125.7	130.3	131	127
0.8	128.1	135.1	149.1	149.9	140.6	127	132.3	143.3	144.1	136.7
2	129.1	136.2	150	151.3	141.7	128.3	133.1	144.3	145.3	137.8
Mean (B)	121.2	127.9	137.5	138.4		120.6	125.6	132.8	133.7	
L.S D at 5%	A 4.1		B 4.3		AB 9.6	A 4.0		B 3.8		AB 5.8

Table 4: Effect of concentrations and number of sprays of elemental sulphur on the percentage of N in the leaves of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	1.13	1.17	1.22	1.24	1.19	1.33	1.41	1.49	1.5	1.43
0.2	1.18	1.22	1.26	1.27	1.23	1.4	1.48	1.56	1.57	1.5
0.4	1.22	1.27	1.31	1.32	1.28	1.46	1.55	1.63	1.63	1.57
0.8	1.27	1.31	1.38	1.37	1.33	1.51	1.59	1.76	1.77	1.66
2	1.28	1.32	1.39	1.38	1.34	1.52	1.6	1.77	1.79	0.167
Mean (B)	1.22	1.26	1.31	1.32	1.44	1.53	1.64	1.65		
L.S D.at 5%	A 0.03		B 0.03		AB 0.07	A 0.05		B 0.07		AB 0.16

Table 5: Effect of concentrations and number of sprays of elemental sulphur on the percentage of P in the leaves of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	0.22	0.18	0.15	0.14	0.17	0.24	0.21	0.17	0.16	0.2
0.2	0.19	0.17	0.15	0.14	0.16	0.22	0.19	0.15	0.14	0.018
0.4	0.17	0.14	0.11	0.11	0.13	0.19	0.16	0.13	0.12	0.15
0.8	0.15	0.13	0.09	0.09	0.12	0.16	0.13	0.1	0.09	0.12
2	0.14	0.12	0.09	0.08	0.11	0.15	0.12	0.09	0.08	0.11
Mean (B)	0.17	0.15	0.12	0.11	0.19	0.16	0.13	0.12		
L.S D at5%	A 0.02		B 0.02		AB 0.04	A 0.02		B 0.03		AB 0.07

Table 6: Effect of concentrations and number of sprays of elemental sulphur on the percentage of k in the leaves of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	1.08	1.05	1.01	1	1.04	1.16	1.12	1.08	1.07	1.11
0.2	1.04	1.01	0.97	0.96	1	1.13	1.1	1.06	1.05	1.09
0.4	1.01	0.96	0.93	0.92	0.96	1.11	1.06	1.03	1.02	1.06
0.8	0.98	0.95	0.9	0.89	0.93	1.08	1.04	0.95	0.94	1
2	0.97	0.94	0.9	0.9	0.93	1.07	1.03	0.94	0.93	0.99
Mean (B)	1.02	0.98	0.94	0.93	1.11	1.07	1.01	1		
L.S D. at5%	A 0.03		B 0.02		AB 0.04	A 0.02		B 0.03		AB 0.07

Table 7: Effect of concentrations and number of sprays of elemental sulphur on the percentage of S in the leaves of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	0.41	0.46	0.52	0.53	0.48	0.52	0.57	0.62	0.63	0.59
0.2	0.47	0.53	0.58	0.59	0.54	0.57	0.61	0.66	0.67	0.63
0.4	0.53	0.57	0.63	0.64	0.59	0.62	0.67	0.72	0.73	0.69
0.8	0.59	0.64	0.75	0.76	0.69	0.67	0.73	0.85	0.86	0.78
2	0.61	0.65	0.76	0.77	0.7	0.68	0.74	0.86	0.87	0.79
Mean (B)	0.52	0.57	0.65	0.66	0.61	0.66	0.74	0.75		
L.S D at 5%	A 0.05		B0.04		AB 0.09	A 0.04		B 0.04		AB 0.09

received sulphur at 2.0% in 2004 and 2005 seasons. The increase in both shoot length and leaf area was in proportional withthe increase in numberof sulphur sprays from one to five. Negligible increment was occurred on such two growth criteria between using sulphur three or four times. The minimum and maximum values were detected on vines received sulphur once and four times, respectively. These results were true in both seasons. The stimulation on growth aspects in response to multiple application of sulphur might be ascribed to the positive action of sulphur on enhancing the biosynthesis of proteins, natural hormone, root formation and cell division[7].

The important role of sulphur in loweringsoil PH that reflected on increasing the availability and uptake of micronutrient did not neglect in this connection[3,19]. The same previous two authors supported the beneficial of sulphur in reducing the incidence of various disorders and maintain the vines in healthy case. These results are in agreement with those obtained by Ahmed *et al*[8], Ahmed*et al*.[9] and Ahmed*et al*.[10].

Effect of sulphur on the leaf contents of N,P,K and S: It is clear from the data in Tables 4,5,6 and 7) that there was a gradual promotion on the leaf content of both N and S and reduction on P and K in the leaf with increasing concentrations of sulphur from 0.0 to 2.0%. Significant differences were observed between all sulphur concentrations except between using 0.8 and 2.0% foliar fertilizing N and S and the minimum P and K in the leaf. Similar results were obtained in both seasons. The change either the increase in the leaf N and S or the decrease in the leaf P and K was raised with the increase in number of sprays. Differences between spraying sulphur either three

Table 8: Effect of concentrations and number of sprays of elemental sulphur on the percentage of berry set of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	8.0	8.6	9.5	9.6	8.9	8.4	9.2	10	10.2	9.5
0.2	9.0	9.8	10.5	10.7	10	9.1	9.9	10.7	10.9	10.2
0.4	9.9	10.7	11.9	12	11.1	9.8	10.7	12	12.1	11.2
0.8	10.6	11.4	12.6	12.7	11.8	10.4	11.3	12.7	12.8	11.8
2	10.7	11.5	12.7	12.8	11.9	10.5	11.4	12.8	12.9	11.9
Mean (B)	9.6	10.4	11.4	11.6	9.6	10.5	11.6	11.8		
L.S D at 5%	A 0.6		B 0.5		AB 1.0	A 0.5		B 0.6		AB 1.2

Table 9: Effect of concentrations and number of sprays of elemental sulphur on the number of clusters per vine of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	28	29	29	30	29	29	31	33	34	31.8
0.2	29	29	30	30	29.5	31	33	34	35	33.3
0.4	29	30	30	30	29.8	33	34	34	34	33.8
0.8	29	30	30	30	29.8	33	35	34	34	34.6
2	29	30	30	30	29.8	33	35	34	34	34
Mean (B)	28.8	29.6	29.8	30	31.8	33.6	33.8	34.2		
L.S D at 5%	A NS		B NS		AB NS	A 1.0		B 1.0		AB 2.0

or four times was highly influenced the leaf content of N, P, K and S in both seasons.

Results concerning the increase in sulphur and nitrogen leaf content with sulfur treatments might be due to sulphur effects on increasing root formation and soil acidity in favour of increasing the availability of these nutrients, consequently a great amount of these macronutrients in the leaves was recorded[4]. However, the reduction in the leaf P and K content as results of increasing sulphur rates could be attributed to the antagonism occurring between sulfur and other elements, which effectively interfere with their absorption, translocation and utilization[3]. These results are in coincidence with these obtained by Moustafa[11], Gobara[12] and Aki[14].

Effect of suplhur on berry set%, yield and cluster weight: Data concerning the effect of sulphur on yield and cluster weight are shown in Table 8,9,10 and 11). It is evident that berry set%, yield expressed in weight and number of clusters per vine in 2005 season) and cluster weight were positively affected by spraying sulphur at 0.2 to 2.0% compared to the control treatment. The increases were associated with increasing the concentrations of sulfur. It is worth to mention that these parameters changed slightly when sulphur was sprayed more than 2.0

The maximum values were obtained when sulphur was applied at a rate of 0.8%. Meaningless effect of sulphur on number of cluster/vine was obtained in the first season of study. Since no materials increase on yield was observed when sulphur concentrations was raised from 2.0 to 2.0%, the recommendation clarified that using sulphur at 0.8% gave satisfactory promotion on yield of flame vines. These result were true in both seasons. Berry set%, yield expressed in weight and number of cluster /vine and cluster weight were gradually improved due to increasing

Table 10: Effect of concentrations and number of sprays of elemental sulphur on the yield per tree of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	8.7	10.2	11.1	11.6	10.4	9.2	10.5	11.9	12.3	11
0.2	9.8	10.8	12.2	12.2	11.3	10.6	12	13.1	13.5	12.3
0.4	10.9	12.2	13.5	13.7	12.6	12.1	13.1	14.2	14.2	13.4
0.8	11.6	12.8	13.5	13.7	12.9	12.9	14.4	14.6	14.7	14.2
2	11.7	12.8	13.6	13.7	13	12.9	14.4	14.7	14.7	14.2
Mean (B)	10.5	11.8	12.8	13	11.5	12.9	13.7	13.9		
L.S D at 5%	A 0.8		B 0.6		AB 1.2	A 1.0		B 0.5		AB 1.0

Table 11: Effect of concentrations and number of sprays of elemental sulphur on the average cluster weight of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	311	350	384	385	357.5	316	340	361	362	344.8
0.2	339	372	404	406	380.3	342	363	385	386	369
0.4	375	408	451	455	422.3	366	386	417	418	396.8
0.8	401	425	451	456	433.3	390	411	430	431	415.5
2	402	426	452	457	434.3	391	412	431	432	416.5
Mean (B)	365.6	396.2	428.4	431.8	361	382.4	404.8	405.8		
L.S D at 5%	A 23.0		B 21.0		AB 40.0	A 21.0		B 15.0		AB 30.0

Table 12: Effect of concentrations and number of sprays of elemental sulphur on harvesting date of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)							
	2004				2005			
Sulphur conc. (A)	Once	Twice	Three	Four	Once	Twice	Three	Four
0	30-Jun	j.27	j.25	j.25	j.28	j.26	j.25	j.25
0.2	27-Jun	j.26	j.24	j.24	j.25	j.23	j.22	j.22
0.4	26-Jun	j.24	j.22	j.22	j.24	j.22	j.20	j.20
0.8	26-Jun	j.24	j.22	j.22	j.24	j.22	j.20	j.20
2	26-Jun	j.24	j.22	j.22	j.24	j.21	j.20	j.20

j = July

number of sulphur sprays from one to four sprays. Results show that there was insignificant change un these parameters when sulphur was sprayed more than three times. Supplying the vines with sulphur four times produced the maximum values. These results were true in both seasons. Three sprays of sulphur at 0.8% proved to be very effective in maximizing the yield of flame vines in both seasons. The positive action of sulphur in enhancing growth and vine nutritional status could reflect in increasing berry set, consequently cluster weight.

Table 13: Effect of concentrations and number of sprays of elemental sulphur on the average berry weight g) of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	2.4	2.9	3.3	3.4	3	2.5	2.9	3.4	3.6	3.1
0.2	2.6	3	3.5	3.7	3.2	2.9	3.3	3.7	3.8	3.4
0.4	2.9	3.4	4.2	4.3	3.7	3.4	3.8	4.4	4.4	4
0.8	3.3	3.7	4.4	4.5	4	3.7	4.1	4.5	4.6	4.2
2	3.4	3.8	4.5	4.6	4.1	3.8	4.2	4.6	4.7	4.3
Mean (B)	2.9	3.4	4	4.1	3.3	3.7	4.1	4.2		
L.S D at5%	A 0.2		B 0.4		AB 0.8	A 0.3		B 0.3		AB 0.6

Table 14: Effect of concentrations and number of sprays of elemental sulphur on the percentage of total soluble solids of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	18.1	18.5	18.8	18.9	18.6	18.5	18.8	19	19.1	18.9
0.2	18.6	19	19.3	19.4	19.1	19	19.4	19.6	19.7	19.4
0.4	19	19.3	19.7	19.8	19.5	19.3	19.6	19.9	20	19.7
0.8	19.3	19.6	19.9	20.1	19.7	19.6	19.9	20.2	20.3	20
2	19.4	19.7	20	20.1	19. 8	19.7	20	20.3	20.4	20.1
Mean (B)	18.9	19.2	19.5	19.7		19.2	19.5	19.8	19.9	
L.S D at 5%	A 0.3		B 0.2		AB 0.4	A 0.2		B 0.2		AB 0.4

Logically the merits of sulphur on improving berry set, cluster weight and number of cluster surely reflected on promoting the yield. These results are in the same line with those obtained by Ahmed *et al.*[8], Moustafa[11] and Gobara *et al.*[12].

Effect of sulphur on harvesting date: It is obvious from the data in Table 12 that foliar application of sulphur at 0.2 to 2.0% was slightly effective in promoting harvesting date compared to the check treatment. Raising sulphur concentrations from 0.4 to 2.0% failed to show any measurable effect on harvesting date. These results were true in both seasons. Raising number of sulphur sprays from one to four caused a slight promotion on harvesting date. Cluster from vines received three to four sprays of sulphur ripened early by about 3-4 days compared to that picked from vines did not receive sulphur in both seasons. The great merit of sulphur in stimulating harvest date was recorded when the vines were sprayed three times with 0.8% sulphur in 2004 and 2005 seasons.

These results could explain through the beneficial effect of sulphur on improving the biosynthesis of carbohydrates and the availability of nutrients which aids in stimulating more organic foods and accumulating great amount of sugars[3]. Similar results were obtained by Moustafa[11] and Aki[14].

Effect of sulphur on some physical and chemical properties of the berries: Data in Tables 13,14 and 15) obviously reveal that berry weight, total soluble solids percentage and total acidity percentage were materially changed according to varying concentrations of sulphur. Foliar application of sulfur at 0.2 to 2.0% was accompanied with improving quality of the barriers in

Table 15: Effect of concentrations and number of sprays of elemental sulphur on the percentage of total acidity in the juice of flame vines in 2004 and 2005 seasons.

	Number of sprays (B)									
	2004					2005				
Sulphur conc. (A)	Once	Twice	Three	Four	Mean (A)	Once	Twice	Three	Four	Mean (A)
0	0.71	0.7	0.671	0.668	0.687	0.721	0.695	0.669	0.666	0.688
0.2	0.661	0.641	0.622	0.62	0.636	0.688	0.65	0.62	0.618	0.644
0.4	0.601	0.59	0.574	0.57	0.584	0.651	0.618	0.59	0.59	0.612
0.8	0.541	0.53	0.52	0.518	0.527	0.62	0.594	0.562	0.56	0.584
2	0.54	0.528	0.517	0.514	0.525	0.618	0.59	0.56	0.558	0.582
Mean (B)	0.611	0.598	0.581	0.578	0.66	0.629	0.6	0.598		
L.S D at 5%	A 0.040		B 0.01		AB 0.020	A 0.031		B 0.025		AB 0.050

terms of increasing berry weight and total soluble solids percentage and reducing the total acidity percentage. The best results were obtained by the addition of sulphur via leaves at 0.8%, since no additional stimulation on fruit quality was detected when sulphur was sprayed more than 0.8%. Number of sulphur sprays was of measurable influence on ftuit quality of flame vines and the promotion on quality of the berries was correlated with increasing number of sprays sulphur. Application of sulphur more than three times failed to cause Significant stimulation on quality of the berries. These results were true in both seasons. The best results with regard when sulphur was applied at 0.8% Three times during The Two growing seasons. These results might be attributed to the positive action of sulphur on the biosynthesis of carbohydrates and in the advancement of fruit ripening[3]. These results confirmed the findings of Gobara *et al*.[12], Wassel *et al*.[14] Aki[13], Ahmed and Morsy[16].

On the light of the present results it can be stated that:

- Sulphur nutrition especially in sandy soils is very necessary for Flame Vines.
- Spraying sulphar at 0.8% three times is satisfied for Producing on economical yield and fairly good quality of berries.

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