EFFECT OF GLUTAMIC ACID AND BORON ON GROWTH AND PRODUCTIVITY OF RED GLOBE GRAPEVINES

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ABSTRACT

This study was carried out during 2015 and 2016 seasons to examine the effect of spraying glutamic acid at 100 to 400 ppm and/or boric acid at 0.025 to 0.1% on growth aspects, vine nutritional status, yield, berries colouration%, sunburned berries% as well as physical and chemical characteristics of Red Globe grapes.

Subjecting the vines to glutamic acid at 100 to 400 ppm and/or boric acid at 0.025 to 0.1 % was very effective in enhancing main shoot length, leaf area, number of leaves/shoot, wood ripening coefficient, cane thickness, pruning wood weight, chlorophyll a & b, total chlorophylls, N, P, K, Mg, yield, cluster weight and dimensions, berries colouration% and both physical and chemical characteristics, it is relative to the control treatment. Percentage of sunburned berries materially tended to reduce with the present treatments. Using glutamic acid was favourable than using boric acid in this respect. Combined application of glutamic acid and boric acid obviously surpassed the application of each alone in this respect.

The best results with regard to yield, berries colouration and quality of the berries were recorded on the vines that received three sprays (growth start, just after berry setting and one month later) of glutamic acid at 200 ppm+ boric acid at 0.05%.

Keywords: Red Globe grapevines, glutamic acid, boric acid, growth, yield, berries quality

INTRODUCTION

Red Globe grape cv grown under Minia region conditions suffered from uneven berries colouration and the sensitivity of the berries to sun-burn. For alleviating such two problems the idea of using boron and amino acids was sprouted.

Boron is favourable for enhancing berry setting, cluster weight and yield due to its striking promoting effect on enhancing fertilization, cell division, uptake of water and nutrients, the tolerance of fruit crops to infection with different disorders and biosynthesis pigments and building and translocation of sugars (**Mengel *et al*.,2001)**. Amino acids have an obvious promotion on the biosynthesis of proteins, plant pigments and natural hormones. They consider as an essential antioxidants help in protecting the plant cells from senescence through preventing the formation of free radicals (reactive oxygen species) (**Davies, 1982**).

Several workers emphasized the outstanding effect of using boron on growth, flowering, yield and fruit quality of grapevines (**Abd El-Wahab, 2010; El-Kady-Hanaa, 2011; Abdelaal *et al*., 2012; Akl *et al*., 2014 and Farahat, 2017**).

Subjecting different grapevine cvs with amino acids had an announced promotion on growth, vine nutritional status, yield and fruit quality (**Amin, 2007; Ahmed *et al*., 2007; Sayed-Heba, 2010; Ahmed *et al*., 2011; Abd El-aal, 2012; Mohamed, 2014 and Rekaby, 2017**).

The merit of this study was examining the effect of spraying boron and glutamic acid on fruiting of Red Globe. The study focused on the effects of these treatments on counteracting the problems of irregular berries colouration and the incidence of sun-burned berries of Red Globe grown under Minia region conditions.

MATERIALS AND METHODS

This study was carried out during 2015 and 2016 seasons on 72 own – rooted 13 years old Red Globe grapevines located in a private vineyard located at Matay district, Minia Governorate. The selected vines are planted at 2 x 3 meters a part. Gable supporting system was followed. The selected vines were short pruned (spur pruning) during the 1st week of Jan. during both seasons leaving 72 eyes(on the basis of 20 fruiting spurs x three eyes + 6 replacement spurs x 2 eyes). The texture of tested soil is clay soil. Surface irrigation system was followed using Nile water. The vines received the common horticultural practices that already applied in the vineyard.

Soil analysis was done according to **Wilde *et al*., (1985)** and the obtained data are shown in Table (1).

Table (1): Analysis of the tested soil

Content	Value
Sand %	6.1
Silt %	22.9
Clay %	71.0
Texture grade	Clay
pH(1: 2.5 extract)	7.69
EC (1: 2.5 extract) dsm^{-1})	0.70
Calcium carbonate %	1.25
O.M	2.0
Total N%	0.09
Available P (Olsen, ppm)	4.1
Available K (ammonium acetate , ppm)	410
Available DTPA	-
Zn	1.9
Fe	2.1
Mn	1.7

The selected vines (72 vines) subjected to the following twelve treatments

1. Control
2. Glutamic acid at 200 ppm
3. Glutamic acid at 400 ppm
4. Boric acid at 0.025 %
5. Boric acid at 0.05 %
6. Boric acid at 0.1 %
7. Glutamic acid at 200 ppm + Boric acid at 0.025 %
8. Glutamic acid at 200 ppm + Boric acid at 0.05 %
9. Glutamic acid at 200 ppm + Boric acid at 0.1 %
10. Glutamic acid at 400 ppm + Boric acid at 0.025 %

11. Glutamic acid at 400 ppm + Boric acid at 0.05 %
12. Glutamic acid at 400 ppm + Boric acid at 0.1 %

Each treatment was replicated three times, two vines per each. Boric acid (17% B) and glutamic acid were sprayed three times at growth start (mid. of March), just after fruit setting (mid. April) and one month later (mid. May). Triton B as a wetting agent was used at 0.05 % to the twelve treatments. Spraying was done till runoff. Randomized complete block design (RCBD) was followed in which the experiment included twelve treatments and each treatment was replicated three times, two vines per each.

During both seasons, the following parameters were recorded:

1- Vegetative growth criteria such as main shoot length (cm), number of leaves/shoot, leaf area $(cm)^2$ (**Ahmed and Morsy, 1999**), wood ripening coefficient (**Bouard, 1966**), cane thickness (cm) and pruning wood weight (kg)/vine.

2- Percentages of N, P, K and Mg (in dry weight basis) in the leaves (**Cottenie *et al*., 1982 and Balo *et al*., 1988**).

3- Leaf photosynthesis pigments namely chlorophylls a & b, total chlorophylls and total carotenoids (mg/1g F.W) (**von-Wettstein, 1957**).

4- Yield expressed in weight (kg) and number of clusters/vine.

5- Weighty (g), length and shoulder of cluster (cm).

6- Percentages of berries colouration and sun-burned berries.

7- Physical and chemical characteristics of the berries namely berry weight (g), T.S.S. %, total acidity % (as g tartaric acid/100 ml juice) (**A.O.A.C., 2000**) and total anthocyanins (mg/1 g F.W) (**Fulcki and Francies, 1968**).

Statistical analysis was done using randomized complete block design (RCBD) according to **Mead *et al*., (1993)**. Treatment means were compared using new L.S.D. at 5%.

RESULTS AND DISCUSSION

1- Vegetative growth characteristics:

Data in Table (2) obviously reveal that spraying glutamic acid at 200 to 400 ppm and/or boric acid at 0.025 to 0.1% significantly was responsible for stimulating the six growth aspects namely main shoot length, number of leaves/shoot, leaf area, wood ripening coefficient, cane thickness and pruning wood weight relative to the control treatment. Using glutamic acid at 200 to 400 ppm significantly was superior than using boric acid at 0.025 to 0.1% in stimulating these growth aspects. There was a gradual stimulation on these growth traits with increasing concentrations of glutamic acid and boric acid. Increasing concentrations of glutamic acid from 200 to 400 ppm and boric acid from 0.05 to 0.1%. Combined applications of glutamic acid at 200 to 400 ppm and boric acid from 0.025 to 0.1% was significantly favourable than using each material alone. The maximum values of these growth aspects were recorded on the vines that treated three times with glutamic acid at 400 ppm plus boric acid at 0.1 %. The lowest values were recorded on the untreated vines. These results were true during both seasons.

The beneficial effects of boron on enhancing cell division, building and translocations of sugars, biosynthesis of IAA and uptake of water and nutrients surely reflected on enhancing growth traits (**Mengel *et al*., 2001**). These results regarding the effect of boron on enhancing growth aspects of Red Globe grapevines are in agreement with those obtained by **Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Abdelaal *et al*., (2012); Akl *et al*., (2014) and Farahat, (2017).** The beneficial effects of glutamic acid on the biosynthesis of proteins, plant pigments and IAA as well as protecting plan cells from oxidation by reach oxygen species could explain the present results (**Davies, 1982**).

The promoting effect of glutamic acid on growth aspects of Red Globe grapevine cv was emphasized by the results of **Amin, (2007); Ahmed *et al*., (2007); Sayed-Heba, (2010); Ahmed *et al*., (2011); Abd El-aal, (*2012*); Mohamed, (2014) and Rekaby, (2017).**

2- **Leaf chemical components:**

It is evident from the data in Tables (3 & 4) that single and combined applications of glutamic acid at 200 to 400 ppm and boric acid at 0.025 to 0.1 % caused significant promotion on N, P, K, Mg, chlorophylls a & b, total chlorophylls and total carotenoids relative to the control treatment. Glutamic acid application significantly surpassed the applications of boric acid in enhancing these nutrients and leaf photosynthetic pigments. There was a progressive promotion on these leaf chemical components with increasing concentrations of glutamic acid and boric acid. Increasing concentrations of glutamic acid from 200 to 400 ppm and boric acid from 0.05 to 0.1 % had meaningless stimulation on these leaf chemical components. Combined applications of glutamic acid and boric acid significantly were preferable than using each material alone in enhancing these nutrients and plant pigments. The maximum values of these leaf chemical components were recorded on the vines that received three sprays of a mixture of glutamic acid at 400 ppm plus boric acid at 0.1 %. The untreated vines produced the lowest values. Similar results were announced during both seasons.

The promoting effect of boron on uptake of water and nutrients as well as the biosynthesis of plant pigments could explain the present results (**Mengel *et al*., 2001**). These results regarding the effect of boron on enhancing growth aspects of Red Globe grapevines are in agreement with those obtained by **Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Abdelaal *et al*., (2012); Akl *et al*., (2014) and Farahat, (2017).** The beneficial effects of amino acids on the biosynthesis of plant pigments could explain the present results (**Davies, 1982**).

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3- **Yield and cluster aspects:**

Data in table (5) noticeably reveal that subjected Red Globe grapevines three times with glutamic acid at 200 to 400 ppm and/or boric acid at 0.025 to 0.1 % significant was accompanied with improving yield expressed in weight and number of clusters/vine as well as weight, length and shoulder of cluster over the control treatment. The promotion significantly was in proportional to the increase in concentrations of glutamic acid and boric acid. Increasing concentrations of glutamic acid from 200 to 400 ppm and boric acid from 0.025 to 0.1 5 failed to show significant promotion on yield and cluster aspects. Yield/vine and cluster aspects were significantly improved in response to using glutamic acid than using boric acid. Combined application of glutamic acid and boric acid significantly was superior than using each material alone in improving yield and cluster aspects. From economical point of view, using glutamic acid at 200 ppm besides boric said at 0.05 % gave the best results with regard to yield. In such promised treatment, yield / vine reached 19.1 and 22.9 kg, while in the untreated vines it reached 16.9 and 17.0 kg during both seasons, respectively. The percentage of on the yield due to using the promise treatment (glutamic acid at 200 ppm + boric acid at 0.05 %) over the control treatment reached 13.0 & 34.7 % during both seasons, respectively. These results were true during both seasons.

The beneficial effects of boron and glutamic acid on enhancing growth aspects and vine nutritional status surely reflected on improving cluster weight and dimensions, thereby the yield/vine.

These results regarding the effect of boron on enhancing growth aspects of Red Globe grapevines are in agreement with those obtained by **Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Abdelaal *et al*., (2012); Akl *et al*., (2014) and Farahat, (2017).** The beneficial effects of amino acids on the biosynthesis of plant pigments could explain the present results (**Davies, 1982**).

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4- **Percentages of berries colouration:**

Percentage of berries colouration as shown in Table (6) significantly was improved in response to treating the vines with glutamic acid at 200 to 400 ppm and/or boric acid at 0.025 to 0.1 % relative to the control. Using glutamic acid at 200 to 400 ppm significantly was superior than using boric acid at 0.025 to 0.1 % in enhancing berries colouration. Increasing concentrations of glutamic acid and boric acid caused a gradual promotion on berries colouration. Increasing concentrations of glutamic acid from 200 to 400 ppm and boric acid from 0.025 to 0.1 % had no significant promotion on berries colouration. Combined application of glutamic acid and boric acid significantly surpassed the application of each material alone in enhancing berries colouration. From economical point view, the best colouration of berries was occurred when the vines treated three times with a mixture of glutamic acid at 200 ppm + boric acid at 0.05 % under such promised treatment berries colouration % reached 81.5 and 83.0 %. While in the untreated vines reached 67.6 and 66.7 % during both seasons, respectively. The percentage of increment on berries colouration % due to use the promised treating over the control treatment reached 20.6 and 24.4 % during both seasons, respectively. These results were true during both seasons.

The beneficial effects of glutamic acid and boric acid on enhancing plant pigments and the biosynthesis of sugars could explain the present results (**Davies, 1982 and Mengel *et al*., 2001**).

These results regarding the effect of boron on enhancing growth aspects of Red Globe grapevines are in agreement with those obtained by **Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Abdelaal *et al*., (2012); Akl *et al*., (2014) and Farahat, (2017).** The beneficial effects of amino acids on the biosynthesis of plant pigments could explain the present results (**Davies, 1982**).

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Table (2): Effect of single and combined applications of glutamic acid and boric acid on some vegetative growth aspects of Red Globe grapevines during 2015 and 2016 seasons

Treatment	Main shoot length (cm.)		No. of leaves/shoot		Leaf area (cm.)		Wood ripening coefficient		Cane thickness (mm)		Pruning wood weight/vine (kg)	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Control	130.1	131.3	15.0	16.0	121.0	122.0	0.69	0.71	0.74	0.76	1.41	1.42
Glutamic acid at 200 ppm	136.0	136.9	18.0	19.0	128.0	128.7	0.86	0.86	1.11	1.15	1.80	1.78
Glutamic acid at 400 ppm	136.4	136.4	18.0	19.0	128.3	129.0	0.87	0.87	1.12	1.16	1.81	1.79
Boric acid at 0.025 %	132.3	133.3	16.0	17.0	123.0	123.8	0.74	0.74	0.85	0.89	1.52	1.50
Boric acid at 0.05 %	134.0	135.3	17.0	18.0	125.0	125.7	0.79	0.79	0.95	1.02	1.64	1.61
Boric acid at 0.1 %	134.3	135.3	17.0	18.0	125.3	126.0	0.80	0.81	0.96	1.03	1.65	1.62
Glutamic acid at 200 ppm + Boric acid at 0.025 %	139.0	140.0	20.0	21.0	130.0	130.8	0.90	0.91	1.29	1.35	1.91	1.89
Glutamic acid at 200 ppm + Boric acid at 0.05 %	141.0	141.9	22.0	23.0	132.0	133.0	0.95	0.95	1.45	1.50	2.11	1.99
Glutamic acid at 200 ppm + Boric acid at 0.1 %	141.3	142.0	23.0	23.0	132.3	133.3	0.96	0.96	1.46	1.51	2.12	2.00
Glutamic acid at 400 ppm + Boric acid at 0.025 %	139.3	140.1	20.0	21.0	130.1	131.1	0.90	0.91	1.30	1.36	1.92	1.90
Glutamic acid at 400 ppm + Boric acid at 0.05 %	141.2	142.0	22.0	23.0	132.3	133.3	0.95	0.95	1.46	1.51	2.12	2.00
Glutamic acid at 400 ppm + Boric acid at 0.1 %	141.4	142.3	23.0	23.0	132.5	133.5	0.96	0.96	1.47	1.52	2.13	2.01
New L.S.D. at 5%	**1.4**	**1.3**	**1.0**	**1.0**	**1.4**	**1.6**	**0.04**	**0.05**	**0.09**	**0.10**	**0.08**	**0.06**

Table (3): Effect of single and combined applications of glutaimc acid and boric acid on the percentages of N, P, K and Mg in the leaves of Red Globe grapevines during 2015 and 2016 seasons

Treatment	Leaf N %		Leaf P %		Leaf K %		Leaf Mg %	
	2015	2016	2015	2016	2015	2016	2015	2016
Control	1.59	1.62	0.114	0.116	1.11	1.14	0.50	0.49
Glutamic acid at 200 ppm	1.91	1.96	0.161	0.167	1.36	1.40	0.72	0.75
Glutamic acid at 400 ppm	1.92	1.97	0.160	0.167	1.37	1.41	0.73	0.76
Boric acid at 0.025 %	1.69	1.74	0.129	0.136	1.18	1.25	0.56	0.60
Boric acid at 0.05 %	1.80	1.86	0.144	0.150	1.26	1.36	0.63	0.68
Boric acid at 0.1 %	1.81	1.88	0.145	0.151	1.27	1.37	0.64	0.69
Glutamic acid at 200 ppm+ Boric acid at 0.025 %	2.01	2.07	0.171	0.181	1.45	1.47	0.80	0.84
Glutamic acid at 200 ppm + Boric acid at 0.05 %	2.11	2.18	0.181	0.194	1.55	1.58	0.86	0.91
Glutamic acid at 200 ppm + Boric acid at 0.1 %	2.12	2.19	0.182	0.195	1.56	1.59	0.87	0.92
Glutamic acid at 400 ppm +Boric acid at 0.025 %	2.02	2.08	0.172	0.182	1.46	1.48	0.81	0.85
Glutamic acid at 400 ppm + Boric acid at 0.05 %	2.12	2.19	0.183	0.195	1.56	1.59	0.87	0.92
Glutamic acid at 400 ppm + Boric acid at 0.1 %	2.13	2.20	0.184	0.196	1.57	1.60	0.88	0.93
New L.S.D. at 5%	**0.06**	**0.05**	**0.010**	**0.011**	**0.04**	**0.03**	**0.03**	**0.03**

Table (4): Effect of single and combined applications of glutathione and boric acid on some leaf pigments of Red Globe grapevines during 2015 and 2016 seasons

Treatment	Chlorophyll a (mg/g F.W)		Chlorophyll b (mg/g F.W)		Total chlorophylls (mg/g F.W)		Total carotenoids (mg/g F.W)	
	2015	2016	2015	2016	2015	2016	2015	2016
Control	3.15	3.20	1.11	1.14	4.26	4.34	1.04	1.03
Glutamic acid at 200 ppm	3.15	3.55	1.36	1.40	4.86	4.95	1.25	1.24
Glutamic acid at 400 ppm	3.51	3.56	1.37	1.41	4.88	4.97	1.26	1.25
Boric acid at 0.025 %	3.24	3.30	1.17	1.22	4.41	4.52	1.10	1.09
Boric acid at 0.05 %	3.34	3.40	1.25	1.29	4.59	4.69	1.16	1.15
Boric acid at 0.1 %	3.35	3.41	1.26	1.30	4.61	4.71	1.17	1.18
Glutamic acid at 200 ppm + Boric acid at 0.025%	3.64	3.70	1.45	1.52	5.09	5.22	1.34	1.35
Glutamic acid at 200 ppm + Boric acid at 0.05 %	3.74	3.80	1.55	1.61	5.29	5.41	1.41	1.42
Glutamic acid at 200 ppm + Boric acid at 0.1%	3.75	3.81	1.56	1.62	5.31	5.43	1.42	1.43
Glutamic acid at 400 ppm + Boric acid at 0.025%	3.65	3.71	1.46	1.53	5.11	5.24	1.35	1.36
Glutamic acid at 400 ppm + Boric acid at 0.05%	3.75	3.81	1.56	1.62	5.31	5.42	1.42	1.43
Glutamic acid at 400 ppm + Boric acid at 0.1%	3.76	3.82	1.57	1.63	5.33	5.45	1.43	1.44
New L.S.D. at 5%	**0.05**	**0.06**	**0.04**	**0.03**	**0.06**	**0.07**	**0.03**	**0.02**

5-Percentage of dun-burned berries:

Data in table (6) clearly show that percentage of sun-burned berries significantly declined with using glutamic acid at 200 to 400 ppm and/or boric acid at 0.025 to 0.1 % relative to the control. The reduction on the percentage of sun-burned berries significantly was correlated with increasing concentrations of glutamic acid and boric acid. Meaningless reduction on sun-burned berries % was observed among the higher two concentrations of glutamic acid and boric acid.

Using glutamic acid significantly was favourable than using boric acid in reducing. Using both materials together significantly gave the lowest values of the application of each material alone. The lowest values of sun-burned berries from economical of point view, (8.0 & 7.0 %) were recorded on the vines that received three sprays of glutamic acid at 200 ppm + boric acid at 0.05 %, while percentage of sun-burned berries reached 19.9 & 20.0 % in the control vines, during both seasons, respectively. These results were true during both seasons.

The effect of boron in enhancing the tolerance of the plants to disorders and facilitating water uptake (**Mengel *et al.*, 2001)** as well as the effect of glutamic acid as ant oxidative on enhancing the tolerance to abiotic stress could be explain the present results (**Davies, 1982**).

These results regarding the effect of boron on enhancing growth aspects of Red Globe grapevines are in agreement with those obtained by **Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Abdelaal *et al*., (2012); Akl *et al*., (2014) and Farahat, (2017).** The beneficial effects of amino acids on the biosynthesis of plant pigments could explain the present results (**Davies, 1982**).

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6-Physical and chemical characteristics:

Data in table (6) clearly show carrying out three sprays of glutamic acid at 200 to 400 ppm and/or boric acid at 0.025 to 0.1 % significantly was very effective in improving quality of the berries in terms of increasing berry weight, T.S.S. %, and total anthocyanins and reducing total acidity % relative to the control. The promotion was significantly correlated with using glutamic acid relative to the application of boric acid as well as with increasing concentrations of glutamic acid and boric acid concentrations. Increasing concentrations of glutamic acid from 200 to 400 and boric acid at 0.05 to 0.1 % failed to show significantly promotion on quality in the vines that received both materials together than using each material alone. The best results were obtained due to using glutamic acid at 200 ppm + boric acid at 0.05 %. Similar trend was noticed during both seasons.

The effect of boron and glutamic acid on enhancing the biosynthesis of pigments and sugars surely reflected on enhancing fruit quality (**Davies, 1982 and Mengel *et al.*, 2001**).

These results regarding the effect of boron on enhancing growth aspects of Red Globe grapevines are in agreement with those obtained by **Abd El-Wahab, (2010); El-Kady-Hanaa, (2011); Abdelaal *et al*., (2012); Akl *et al*., (2014) and Farahat, (2017).** The beneficial effects of amino acids on the biosynthesis of plant pigments could explain the present results (**Davies, 1982**).

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Table (5): Effect of single and combined applications of glutathione and boric acid on the yield, average cluster weight and dimensions of Red Globe grapevines during 2015 and 2016 seasons

Treatment	No. of clusters/vine		Yield/vine (kg)		Av. Cluster weight (g)		Av. Cluster length (cm)		Av. Cluster shoulder (cm)	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
Control	24.0	24.0	16.9	17.0	705.0	707.0	25.0	24.1	10.1	10.2
Glutamic acid at 200 ppm	24.0	28.0	17.8	20.8	740.0	741.0	26.2	25.5	11.0	11.1
Glutamic acid at 400 ppm	24.0	28.0	17.9	20.8	741.0	741.5	26.3	25.6	11.1	11.2
Boric acid at 0.025 %	24.0	25.0	17.2	17.9	715.0	717.0	25.3	24.5	10.4	10.5
Boric acid at 0.05 %	24.0	26.0	17.4	18.9	725.0	726.0	25.6	24.9	10.5	10.6
Boric acid at 0.1 %	24.0	26.0	17.4	18.9	726.0	726.0	25.7	25.0	11.6	10.7
Glutamic acid at200ppm+Boric acid at 0.025%	24.0	29.0	18.0	21.8	751.0	752.0	27.0	26.1	12.1	12.2
Glutamic acid at200 ppm+Boric acid at 0.05%	25.0	30.0	19.1	22.9	762.0	763.0	27.5	27.3	12.5	12.6
Glutamic acid at 200 ppm+Boric acid at 0.1 %	25.0	30.0	19.1	22.9	763.0	763.0	27.6	27.4	12.6	12.7
Glutamic acid at400ppm+Boric acid at0.025%	24.0	29.0	18.0	21.9	751.0	752.0	27.1	26.2	12.2	12.3
Glutamic acid at400ppm+Boric acid at 0.05 %	25.0	30.0	19.1	22.9	762.5	763.0	27.6	27.4	12.5	12.7
Glutamic acid at 400 ppm+Boric acid at 0.1 %	25.0	30.0	19.8	22.9	763.0	763.0	27.6	27.5	12.8	12.8
New L.S.D. at 5%	**NS**	**1.0**	**0.3**	**0.5**	**8.1**	**8.7**	**0.2**	**0.3**	**0.2**	**0.2**

Table (6): Effect of single and combined applications of glutathione and boric acid on percentages of berries colouration and sunburned berries and some chemical characteristics of the berries of Red Globe grapevines during 2015 and 2016 seasons

Treatment	Berries colouration %		Sunberries berry %		Berry weight (g)		T.S.S. %		Total acidity %		Total anthocyanins (mg/1.0 g F.W)	
	2015	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**
Control	67.6	66.7	19.9	20.0	10.1	10.3	17.0	17.2	0.681	0.683	24.1	23.9
Glutamic acid at 200 ppm	75.9	77.0	12.0	11.9	11.9	12.0	19.0	19.2	0.620	0.621	27.3	28.0
Glutamic acid at 400 ppm	76.0	77.1	11.9	11.9	12.0	12.0	14.1	14.3	0.619	0.620	27.4	28.1
Boric acid at 0.025 %	70.0	71.1	15.0	14.8	10.6	10.7	17.6	17.8	0.661	0.662	25.1	25.8
Boric acid at 0.05 %	72.5	73.6	13.5	13.3	11.1	11.2	18.2	18.3	0.641	0.641	26.1	26.8
Boric acid at 0.1 %	72.6	73.7	13.4	13.2	11.2	11.3	18.3	18.4	0.640	0.640	26.2	26.9
Glutamic acid at 200 ppm + Boric acid at 0.025 %	79.0	80.2	10.0	9.9	12.6	12.8	19.9	21.1	0.601	0.601	28.9	29.6
Glutamic acid at 200 ppm + Boric acid at 0.05 %	81.5	83.0	8.0	7.9	13.1	13.3	20.6	20.7	0.580	0.579	30.0	31.0
Glutamic acid at 200 ppm + Boric acid at 0.1 %	81.6	83.1	7.9	7.8	13.2	13.4	20.6	20.8	0.579	0.578	30.1	31.1
Glutamic acid at 400 ppm + Boric acid at 0.025 %	79.5	80.3	9.9	9.7	12.7	12.9	20.0	21.2	0.600	0.600	29.0	29.7
Glutamic acid at 400 ppm + Boric acid at 0.05 %	81.6	83.1	7.9	7.7	13.2	13.4	20.6	20.8	0.579	0.577	30.0	31.1
Glutamic acid at 400 ppm + Boric acid at 0.1 %	81.8	83.2	7.8	7.5	13.3	13.0	20.6	20.9	0.578	0.573	30.2	31.2
New L.S.D. at 5%	**1.1**	**1.2**	**1.3**	**1.0**	**0.4**	**0.5**	**0.5**	**0.5**	**0.015**	**0.014**	**0.6**	**0.7**

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تاثير حامض الجلوتاميك والبورون علي نمو وانتاجية العنب الردجلوب

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**قسم البساتين –كلية زراعة الوادى الجديد–جامعة أسيوط- مصر

اجريت هذه الدراسة بمزرعة خاصة بمركز مطاى بمحافظة المنيا بـ ج. م. ع خلال موسمى ٢٠١٥، ٢٠١٦ لاختبار تاثير رش حامض الجلوتاميك بتركيز ٢٠٠ و ٤٠٠ جزء فى المليون وحامض البوريك بتركيز ما بين ٠.٠٢٥ الي ٠.٠١% فى الصورة المنفردة او المشتركة علي صفات النمو الخضرى والحالة الغذائية للكرمة وكمية المحصول والنسبة المئوية لتلوين الحبات فى العنقود والنسبة المئوية للحبات المصابة بضربة الشمس والخصائص الطبيعية والكيميائية لحبات العنب الرد جلوب.

كانت معاملة الكرمات بحامض الجلوتاميك بتركيز ما بين ٢٠٠و ٤٠٠ جزء فى المليون وحامض البوريك بتركيز ما بين ٠.٠٢٥ الي ٠.٠١ % فى الصورة المنفردة او التوليفات بينهما فعالا جدا فى تحسين صفات النمو الخضرى وهى طول الفرخ الرئيسي ومساحة الورقة وعدد الاوراق علي الفرخ ومعامل نضج الخشب ووزن خشب التقليم/الكرمة وسمك القصبات والكلوروفيل أ و ب والكلوروفيل الكلى والنيتروجين والفوسفور والبوتاسيوم والماغنسيوم وكمية المحصول ووزن العنقود وابعاده والنسبة المئوية لتلوين الحبات وكذلك الخصائص الطبيعية والكيميائية للحبات وذلك مقارنة بمعاملة الكنترول كذلك ادى الى نقص واضح فى النسبة المئوية للحبات المصابة بضربة الشمس.

ولقد تفوق استخدام حامض الجلوتاميك عن حامض البوريك فى هذا الصدد كما تفوق استخدام التوليفة المشتركة بينهما عن الاستخدام الفردى.

امكن الحصول علي افضل النتائج بخصوص كمية المحصول وتلوين الحبات وخصائص الجودة للحبات عند معاملة الكرمات ثلاث مرات (فى بداية النمو وبعد عقد الحبات مباشرة وبعدها بشهر) بمخلوط من حامض الجلوتاميك بتركيز ٢٠٠ جزء فى المليون وحامض البوريك بتركيز ٠.٠٥% .

الكلمات الدالة: كرمات العنب الرد جلوب- حامض الجلوتاميك- حامض البوريك- خصائص النمو – كمية المحصول- خصائص الجودة للحبات.