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EFFECT OF NITROGEN SOURCE ON FRUIT QUALITY OF SUPERIOR SEEDLESS GRAPEVINE UNDER COLD STORAGE CONDITIONS

BY

Abdrabboh, G.A. AND Abdel-Razik, A.M,
Department of Horticulture, Faculty of Agriculture, Al-Azhar University, Cairo, Egypt.

ABSTRACT

This work was carried out during the two successive seasons of 2006 and 2007 on seven years-old Superior seedless grapevines to study the effect of some biofertilizers (Biogen, Nitrobiene and Rhizobacterine, (all at 30 g/ vine) and ammonium nitrate (33% N) at different doses ranging from 25% up to 100% of the recommended nitrogen dose (60 units/feddan) and their interaction on fruit quality of Superior seedless grape fruits under cold storage condition. All treatments were done before bud burst. Biogen plus 25% of the recommended mineral N was the best treatment for obtaining the least weight loss percentage while Rhizobacterine plus 75% N gave the best results regarding the least decay percentage. Maximum decrease in berry abscission was obtained by using Nitrobene supplemented with 25% of the recommended mineral N. Maximum firmness was attained by using Nitrobene plus 75% of the recommended mineral N. Maximum TSS value was attained when Biogen plus 25% of the recommended mineral N was applied. Total acidity decreased by increasing the period of cold storage. The minimum value of total acidity was gained when Biogen plus 25% of mineral N was used. TSS/Acid ratio increased by prolonging cold storage period and the maximum value was recorded by using Biogen plus 25% of mineral N.

INTRODUCTION

Grape (*Vitis vinifera* L.) is one of the most important fruit crops in Egypt since it ranks the second fruit crop preceded only by Citrus. The total acreage of grapevines in Egypt showed a steady increase since it attained 165786 feddans with a production of 1431966 tons according to the latest statistics of Ministry of Agriculture (2007). In this regard, Superior seedless grape variety has a significant promise for exporters due to its early fruits maturation, its seedlessness and crispy texture of berries and for the thick berry skin that makes overseas exportation possible. However, information about mineral nitrogen units which is required by Superior seedless is rare and varied from farm to farm. According to the recommendation of the Ministry of Agriculture, 60 units of nitrogen are enough for producing an adequate yield. On the other hand, with Superior seedless grape variety, the high doses of mineral nitrogen fertilization caused shot berries and minimized marketable yields. So, an attempt to determine the suitable nitrogen doses for producing good yield and quality of Superior seedless grapes will be studied. On the other side of view, biofertilizers application as substitution units to mineral nitrogen fertilization is more important in grape production (Ahmed *et al.*, 1997). Biogen Rhizobacterine and Nitrobene are biofertlizers that mainly consists of beneficial bacteria such as *Azotobacter chrococcum* which live in the soil as autotrophs and has the ability to fix atmospheric N in their cells by nitrogenous enzyme and can also secrete IAA, GA_3 and natural antibiotics (Ahmed *et al.*, 1997). The microorganisms can also release nutrient substances from plant residues in the soil and make them available for the plants. Previous studies on the beneficial effect of biofertlizers on yield and quality of different fruit trees has been demonstrated (Darwish *et* *al.*, 1996; Ahmed *et al.*, 1997; El-Mogy *et al.*, 1998; Mahmoud 2000; El-Shamma and Abd El-Hady, 2001; Abd El-Hady, 2003 and Abd El-Hamid *et al.*, 2004). Therefore, this study was conducted to determine the effect of different ammonium nitrate doses either alone or in combination with biofertlizers on physical and chemical changes in berries of Superior seedless cv. under cold storage.

MATERIALS AND METHODS

This investigation was carried out during the two successive seasons 2006-2007 on six years-old Superior seedless grapevines grown in a private vineyard at 65 kilometers on Cairo- Alexandria desert road. Sixty vines were chosen nearly similar in growth, planted on sandy soil 2 x 3m a part. Ten treatments were performed according to the complete randomized block design in which each treatment contained three replicates, two vines per each. The vines were fertilized by phosphorus (40 units of P_2O_5) in the form of calcium super phosphate 15.5% and potassium (100 units of K_2O) as potassium sulphate. All biofertilizers were soil added at once, one week before bud burst in as a soil drench around each vine then covered with soil and irrigated with water. The mineral N was added to the soil through drip irrigation in the form of ammonium nitrate. The added doses were dispensed as follows. 15% after bud burst and before flowering, 50% after flowering till the beginning of berries maturity and 35% after harvest. Control treatment had received mineral N only without adding biofertilizers. The treatments used were.

Ser. No.	M. nitrogen as % of total N	Kind of biofertilizer	Biofertilizer (g/ vine)
1- Control	100% +		0.0 g/ vine
2	25% +	Biogen (B)	30 g/ vine
3	50% +	Biogen (B)	30 g/ vine
4	75% +	Biogen (B)	30 g/ vine
5	25% +	Nitrobiene (N)	30 g/ vine
6	50% +	Nitrobiene (N)	30 g/ vine
7	75% +	Nitrobiene (N)	30 g/ vine
8	25% +	Rhizobacterine (R)	30 g/ vine
9	50% +	Rhizobacterine (R)	30 g/ vine
10	75% +	Rhizobacterine (R)	30 g/ vine

Thirty clusters from each treatment (10 clusters of each replicate) were harvested when the TSS% of the berry juice reached 16-17%, packed gently in perforated 3 boxes (10 clusters/each) and stored at 0°C with 90% ± 2% relative humidity. Decayed fruits in any treatment were excluded. Fruit physical and chemical characteristics during storage were biweekly determined as follows.

1- Physical characteristics.

Decay % =

$$\frac{\text{No. of decayed berries of a cluster at inspection day}}{\text{Initial No. of stored barriers}} \times 100$$

Weight loss % =

$$\frac{\text{Fruit weight at inspection day - fruit weight before storage}}{\text{Average fruit weight before storage}} \times 100$$

Berry firmness was measured in Lb/inch^2 using pressure tester (digital force – Gouge Model IGV-O.SA to FGV-100A. Shimpo instruments).

Berry abscission % =

$$\frac{\text{Number of abscised berries at sampling date}}{\text{Initial No. of stored berries}}$$

2- Fruit chemical characteristics.-

The determined chemical characteristics parameters of fruits such as berry juice TSS %, total acidity and TSS/ Acid ratio were recorded.

Statistical analysis:

The obtained data were subjected to analysis of variance (ANOVA) according to Snedecor and Cochran (1968) using Mstat program. Least significant differences (L.S.D) were used to compare between means of treatments according to Waller and Duncan (1969) at probability of 5%.

RESULTS AND DISCUSSION

Effect of Nitrogen source on physical characteristics.

a. Weight loss percentage.-

Data presented in Table (1) cleared that loss percentage in berries weight gradually increased as storage period advanced and attained the maximum decay percentage in all treatments including control. Biogen plus 75% of recommended mineral nitrogen showed higher weight loss percentage from 75 to 90 days under cold storage followed descendingly by Rhizobaterine and Nitrobene at the same rate than those of other treatments including control. This was true in the two tested seasons. However, fruits treated with 30g/vine Biogen plus 25% of recommended mineral nitrogen possessed the lowest significant values of weight loss% as compared to the control and the other treatments. These results are in agreement with those of Abo-Shanab (1977) who found that weight loss percentage increased gradually with prolonged storage period. Similar results were obtained by Mohamed (1980), El-Banna *et al.* (1984a), Wassel (1985), Abdel-Hamid (2000) and Abdel Wahab and El-Shinawy (2004).

Table (1): Effect of nitrogen source on weight loss% of Superior seedless grapevine under cold storage condition in 2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	0	1.2	2.13	3.67	4.77	6.39	10.81	**4.14**
2	25% + 30 B	0	0.77	2.07	3.28	5.06	6.76	7.14	**3.58**
3	50% + 30 B	0	2.07	4.13	5.36	6.49	8	11.43	**5.28**
4	75% + 30 B	0	2.37	4.36	6.73	11.2	13.52	15.48	**7.67**
5	25% + 30 N	0	0.78	2.65	5.61	8.38	11.02	13.6	**6.01**
6	50% + 30 N	0	1.54	3.78	5.7	8.37	9.42	12.9	**5.96**
7	75% + 30 N	0	0.61	2.55	4.77	5.52	12.08	16.24	**5.97**
8	25% + 30 R	0	0.77	1.91	2.79	4.81	7.79	15.77	**4.84**
9	50% + 30 R	0	1.24	3.2	5.27	6.34	7 25	12.27	**5.08**
10	75% + 30 R	0	1.16	3.96	6.97	8.6	10.84	14.4	**6.56**
	Mean	**0**	**1.25**	**3.07**	**5.02**	**6.95**	**9.31**	**13**	
L.S.D at 0.05		**= 2.59**							
		2007							
1	100 + 0.0	0	1.18	2.09	3.64	4.83	6.27	11.01	**4.15**
2	25% + 30 B	0	0.77	2.06	3.26	5	6.82	7.1	**3.57**
3	50% + 30 B	0	2.06	3.85	5.07	6.19	8.01	12	**4.67**
4	75% + 30 B	0	2.31	4.34	6.34	11.25	13.27	15.37	**7.55**
5	25% + 30 N	0	0.8	2.31	6	7.89	11.84	13.65	**4.99**
6	50% + 30 N	0	1.77	3.65	4.79	8.36	12.49	10.14	**5.89**
7	75% + 30 N	0	0.65	2.87	5.29	5.83	12.31	15.14	**6.02**
8	25% + 30 R	0	0.86	1.91	3.19	5.49	7.94	15.4	**4.97**
9	50% + 30 R	0	1.13	3.01	5.52	6.59	7.67	13.4	**5.33**
10	75% + 30 R	0	1.47	4.22	7.03	8.97	10.36	14.22	6.61
	Mean	**0**	**1.3**	**3.03**	**5.01**	**7.04**	**9.7**	**12.74**	
L.S.D at 0.05		**= 2.49**							

a. Decay %.

Results in Table (2) showed that berries decay under cold storage was increased considerably with prolonged storage period in all treatments as well as the control in both seasons. Any treatment was terminated as the percentage of decay reached about 50%. In this regard, Melero & Lizana (1988) cleared that decay of stored grapes was increased gradually with advanced storage. It was referred in the Table (2) that at 75 days of storage period, fruits of trees which treated with Nitrobiene at 30g/vine supplemented with mineral nitrogen at 25 or 50 % of M. N. were excluded due to the attaining over 50% of decay in comparison to other treatments including control. On the other hand, the results showed that Rhizobacterine at 30g/tree supplemented with 75% of recommended mineral nitrogen possessed the lowest values of decay percentage among all treatments in the two seasons. These results are in agreement with those of Abdel-Hamid (2000), and Abdel Wahab and El-Shinawy (2004) who reported that decay percentage of cold stored grapes was increased with advancing storage period.

Table (2): Effect of nitrogen source on decay % of Superior seedless grapevine under cold storage condition in2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	0	0.33	2.33	6.33	15	32	51.67	**15.38**
2	25% + 30 B	0	1	4.67	9.33	18	34.67	51.5	**17.02**
3	50% + 30 B	0	0.67	2	6.67	20.67	24.5	52.2	**15.29**
4	75% + 30 B	0	0.33	2	3	14.67	32.67	54	**15.24**
5	25% + 30 N	0	0.67	1.67	12	42.67	58		**16.43**
6	50% + 30 N	0	1	3.66	12.66	40.33	53.33		**15.87**
7	75% + 30 N	0	0	1	3.66	32.33	40	51	**18.29**
8	25% + 30 R	0	0	1	3.33	13.67	42	52.33	**16.05**
9	50% + 30 R	0	0.33	0.66	0.66	11	33.66	51.33	**13.95**
10	75% + 30 R	0	0.67	1.33	1.66	4.66	24	50.66	**11.86**
	Mean	**0**	**0.5**	**2.03**	**5.93**	**21.3**	**37.48**	**41.47**	
L.S.D at 0.05		**= 7.23**							
	2007								
1	100 + 0.0	0	2.33	5	8.67	15.33	33.33	50.67	**16.48**
2	25% + 30 B	0	1.67	6	11.67	19.33	36.33	52	**18.14**
3	50% + 30 B	0	1.33	4	13	19.33	37	52	**18.1**
4	75% + 30 B	0	0.67	4	9	18.67	38.67	51.67	**17.52**
5	25% + 30 N	0	0	3.33	10.33	38.67	49.5	52	**21.98**
6	50% + 30 N	0	1	5	17.67	40.33	51.5		**16.5**
7	75% + 30 N	0	3.33	8	18.33	36.33	51.33		**16.76**
8	25% + 30 R	0	0	2.67	8.67	19.33	38	50.67	**17.05**
9	50% + 30 R	0	1.67	4.67	9.33	15	32	48.33	**15.86**
10	75% + 30 R	0	1	2.67	8	17	36.33	51.67	**16.67**
	Mean	**0**	**1.3**	**4.53**	**11.47**	**23.93**	**40.4**	**40.9**	
L.S.D at 0.05		**= 7.03**							

c. Berry abscission %

Data in Table (3) clearly showed that berry abscission percentage gradually increased with advancing storage period and attained the maximum abscission % of berries after 90 days under cold storage at 0°C in all treatments including control in the two seasons. Biogen supplemented with 75% of recommended mineral nitrogen showed higher abscission percentage from 75 to 90 days under cold storage than that of other treatments. Berries of the trees which treated with Nitrobine and M.N at any dose reached over 20 % of berry abscission after only 75 days under cold storage in comparison to other treatments in the two seasons. Any treatment that reached over 20 % of berry abscission had been excluded. However, Fruits treated with 30g/vine of Nitrobene supplemented with 25% of recommended mineral nitrogen gave the lowest significant values of berry abscission % during the two seasons. Regarding the effect of Biofertilizers (Biogen, Nitrobiene and Rhizobacterine) on berry abscission, it can be concluded that Rhizobacterine supplemented with mineral N at any given concentration gave the least abscission percentage followed descendingly by Nitrobiene and Biogen. These results can be confirmed with the findings of Wassel (1985) and Abdel-Wahab and El-Shinawy (2004) who reported that Berry adherence of grapes decreased during prolonged storage period, therefore, berry abscission% increased (Abdel-Hamid 2000).

Table (3): Effect of nitrogen source on berry abscission % of Superior seedless grapevine under cold storage condition in 2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	0	0.33	1.67	4.66	10	18	21.66	**8.05**
2	25% + 30 B	0	0.66	1.66	8	14.66	1.33		**6.62**
3	50% + 30 B	0	1	1.33	5.33	11.66	18	23	**8.48**
4	75% + 30 B	0	0.33	2	7.67	16.66	21.66		**6.09**
5	25% + 30 N	0	0	1	3.66	21.33			**3.71**
6	50% + 30 N	0	0.66	1.66	6	16	20.66		**6.43**
7	75% + 30 N	0	1	2.66	7.66	14	23		**6.9**
8	25% + 30 R	0	0.33	0.67	1.33	10.33	19.33	21.33	**7.62**
9	50% + 30 R	0	0	1	3.66	11.66	22	21.58	**8.56**
10	75% + 30 R	0	0.67	1.33	4.33	12.33	21	21.58	**8.75**
	Mean	**0**	**0.5**	**1.5**	**5.23**	**13.86**	**16.5**	**10.92**	
L.S.D at 0.05		**= 2.81**							
		2007							
1	100 + 0.0	0	1	3	5.67	10	17.33	20.67	**8.24**
2	25% + 30 B	0	0	1.33	5.33	11.67	16.33	21.67	**8.05**
3	50% + 30 B	0	0.33	1.67	5.33	12	20.67		**5.71**
4	75% + 30 B	0	1.67	4.33	9.67	16.67	22.67		**7.86**
5	25% + 30 N	0	0	0.67	4	21			**3.67**
6	50% + 30 N	0	1.67	4	8.33	14.33	22		**7.19**
7	75% + 30 N	0	1.33	3.33	9	18	22		**7.67**
8	25% + 30 R	0	0	0.33	3	9.67	21		**4.86**
9	50% + 30 R	0	0	1.67	6	13.33	21		**6**
10	75% + 30 R	0	1.33	3.67	7.33	13	21		**6.62**
	Mean	**0**	**0.73**	**2.4**	**6.37**	**13.97**	**18.4**	**4.23**	
L.S.D at 0.05		**= 2.33**							

d. Firmness.

As can be shown in Table (4), it is clear that berries firmness gradually decreased under cold storage in all treatments including control. In this regard, Data presented in Table (4) cleared that berries of 30g/vine Nitrobiene supplemented with 75% of recommended mineral nitrogen possessed higher firmness values than those of other treatments including control up to 90 days in cold storage. On the other hand, data cleared that Rhizobacterine at 30g/vine supplemented with mineral N at any given concentration gave the lowest values of firmness in comparison to these of Nitrobiene and Biogen fertilizers, in both seasons. The present results are in agreement with those obtained by Kokkalos, (1981) and Abdel-Wahab and El-Shinawy (2004) who reported that there was a decrease in firmness reading with advancing storage period of grapes. The limited loss in berry firmness is considered to be one of the most important traits of quality during transport, handling and storage (Shear, 1975).

Table (4): Effect of nitrogen source on firmness (Lb/inch^2) of Superior seedless grapevine under cold storage condition in 2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	3.09	2.77	2.44	2.34	2.27	2.15	2.04	**2.44**
2	25% + 30 B	2.62	2.44	2.28	2.18	2.12	2.03	1.96	**2.23**
3	50% + 30 B	2.56	2.44	2.3	2.23	2.12	2.08	2	**2.25**
4	75% + 30 B	2.63	2.57	2.49	2.43	2.31	2.19	2.13	**2.39**
5	25% + 30 N	2.57	2.47	2.32	2.22	2.16	2.06	1.96	**2.25**
6	50% + 30 N	2.88	2.64	2.5	2.44	2.31	2.17	2.09	**2.43**
7	75% + 30 N	2.98	2.77	2.64	2.55	2.46	2.35	2.22	**2.57**
8	25% + 30 R	2.43	2.27	2.18	2.09	2.04	1.91	1.82	**2.11**
9	50% + 30 R	2.68	2.35	2.22	2.15	2.02	1.91	1.81	**2.16**
10	75% + 30 R	2.9	2.48	2.37	2.23	2.15	2.05	1.95	**2.3**
	Mean	**2.73**	**2.52**	**2.37**	**2.29**	**2.2**	**2.09**	**2**	
L.S.D at 0.05		**= 0.06**							
		2007							
1	100 + 0.0	2.73	2.65	2.61	2.5	2.4	2.31	2.17	**2.48**
2	25% + 30 B	2.54	2.44	2.32	2.21	2.1	2.04	1.92	**2.2**
3	50% + 30 B	2.48	2.46	2.4	2.29	2.15	2.07	1.99	**2.26**
4	75% + 30 B	2.58	2.53	2.45	2.36	2.3	2.17	2.06	**2.36**
5	25% + 30 N	2.5	2.45	2.37	2.28	2.21	2.12	2.03	**2.27**
6	50% + 30 N	2.63	2.57	2.49	2.42	2.3	2.2	2.12	**2.39**
7	75% + 30 N	2.73	2.65	2.56	2.46	2.34	2.2	2.09	**2.42**
8	25% + 30 R	2.52	2.45	2.35	2.25	2.13	2.06	1.99	**2.28**
9	50% + 30 R	2.55	2.45	2.37	2.29	2.22	2.15	2.05	**2.27**
10	75% + 30 R	2.62	2.49	2.43	2.34	2.22	2.12	2	**2.34**
	Mean	**2.59**	**2.51**	**2.43**	**2.34**	**2.24**	**2.14**	**2.04**	
L.S.D at 0.05		**= 0.45**							

2. Chemical Characteristics.-

2.1. Total Soluble solids (TSS %).

Data in Table (5) cleared that TSS of berries Juice gradually increased with the prolonging of storage period in both seasons. Thus, the highest values of total soluble solids were recorded at the end of storage period in both seasons. This result is in agreement with the findings of Hifny and Abdel-All (1977) and Abdel-Wahab and El-Shinawy (2004) who reported that total soluble solids content of stored grape fruits were gradually increased with the prolonged storage period. The present results also showed that maximum increase was recorded by the combined application of Biogen at 30g/vine and 25% of recommended mineral nitrogen while Nitrobene at 30g /vine plus 25% of recommended mineral nitrogen treatment showed the least percentage of TSS %. This increase in TSS percentage may be due to water loss (Hifny and Abdel-All, 1977). Regarding to the effect of Biofertlizers on TSS of fruits, it can be noticed from the data presented in Table (5) that vines which treated with 30g/vine Biogen and mineral N at any given concentration possessed the highest TSS values in comparison to Rhizobacterine and Nitrobene respectively. These results are in agreement with those obtained by Abd El-Hady (2003) who reported that application of Biogen at 40g/vine plus mineral N at 40g/vine achieved the best results with regard to fruit quality of flame seedless grape vines, in comparison to Rhizobacterine and Microbene.

Table (5): Effect of nitrogen source on TSS % of Superior seedless grapevine under cold storage condition in2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	16.67	16.93	17.23	17.6	18.03	18.5	19.03	**17.71**
2	25% + 30 B	17.67	18.67	19.17	19.57	19.9	20.3	20.6	**19.41**
3	50% + 30 B	18.17	18.47	18.77	19.23	19.57	19.93	20.23	**19.2**
4	75% + 30 B	17.17	17.63	18	18.47	18.83	19.27	19.63	**18.43**
5	25% + 30 N	16	16.47	16.8	17.13	17.5	17.83	18.13	**17.12**
6	50% + 30 N	16.16	16.7	17.13	17.43	17.73	18.33	18.66	**17.45**
7	75% + 30 N	16.83	17.03	17.4	17.66	17.96	18.2	18.53	**17.66**
8	25% + 30 R	16.5	16.8	17.16	17.56	17.9	18.26	18.56	**17.54**
9	50% + 30 R	17	17.43	17.76	18.13	18.46	18.83	19.2	**18.12**
10	75% + 30 R	17.33	17.9	18.23	18.6	19	19.4	19.87	**18.62**
	Mean	**16.95**	**17.4**	**17.77**	**18.14**	**18.49**	**18.89**	**19.24**	
L.S.D at 0.05		**= 0.75**							
		2007							
1	100 + 0.0	16.7	17	17.4	17.73	18.16	18.5	19	**17.75**
2	25% + 30 B	17.87	18.33	18.83	19.33	19.6	20.16	20.57	**19.29**
3	50% + 30 B	17.67	18.1	18.6	18.9	19.36	19.73	20.07	**18.91**
4	75% + 30 B	17.23	17.8	18.17	18.5	18.83	19.3	19.77	**18.51**
5	25% + 30 N	16.7	16.93	17.2	17.53	17.87	18.03	18.47	**17.53**
6	50% + 30 N	16.83	17.3	17.7	18.17	18.67	18.97	19.77	**18.23**
7	75% + 30 N	16.5	16.87	17.17	17.5	17.93	18.33	18.63	**17.54**
8	25% + 30 R	16.27	16.7	17.13	17.57	17.9	18.17	18.53	**17.46**
9	50% + 30 R	16.8	17.23	17.6	18.1	18.43	18.73	19.13	**17.95**
10	75% + 30 R	16.97	17.37	17.8	18.3	18.6	19.03	19.47	**18.19**
	Mean	**16.95**	**17.36**	**17.76**	**18.16**	**18.54**	**18.9**	**19.34**	
L.S.D at 0.05		**= 0.75**							

2.2. Total acidity %

As shown in Table (6) it is clear that total acidity % of berries was significantly decreased with prolonging cold storage periods where they had the minimum acidity percentage at the end of storage period, during the two seasons of study. This result is in agreement with those of Abd El-Hamid (2000) and Abdel-Wahab and El-Shinawy (2004) who stated that total acidity % of cold stored grapes was decreased with prolonging cold storage. It seems that grapes respiration concumed higher rates of acid since total acidity was reduced with prolonging cold storage period (Abdel-Hamid 2000). The data in Table (6) also showed that berries of vines treated with Rhizobacterine at 30g/vine plus mineral N at 50 or 75 % of recommended nitrogen possessed the maximum value of total acidity percentage in comparison with all other treatments including control. On the other hand, berries of vines which were treated with Biogen or Nitrobene at 30g/vine plus 25 % of mineral N gave the minimum amount of total acidity percentage, in comparison with all other treatments. These results can be supported by those of Abdel-Hamid *et al.* (2004) who reported that the least titratable acidity was obtained with fertilization of 50% nitrogen plus biofertilizers.

Table (6): Effect of nitrogen source on total acidity % of Superior seedless grapevine under cold storage condition in2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	0.92	0.85	0.8	0.74	0.71	0.65	0.59	**0.75**
2	25% + 30 B	0.75	0.71	0.67	0.63	0.57	0.54	0.5	**0.62**
3	50% + 30 B	0.82	0.78	0.74	0.73	0.69	0.65	0.6	**0.72**
4	75% + 30 B	0.9	0.86	0.82	0.76	0.72	0.68	0.63	**0.77**
5	25% + 30 N	0.75	0.71	0.67	0.63	0.58	0.54	0.5	**0.63**
6	50% + 30 N	0.92	0.87	0.82	0.79	0.76	0.72	0.69	**0.79**
7	75% + 30 N	0.92	0.88	0.85	0.81	0.77	0.72	0.69	**0.81**
8	25% + 30 R	0.85	0.81	0.77	0.74	0.7	0.67	0.63	**0.74**
9	50% + 30 R	0.95	0.91	0.87	0.84	0.81	0.78	0.74	**0.84**
10	75% + 30 R	0.98	0.92	0.89	0.85	0.82	0.78	0.75	**0.86**
	Mean	**0.87**	**0.83**	**0.79**	**0.75**	**0.71**	**0.67**	**0.63**	
L.S.D at 0.05		**= 0.07**							
		2007							
1	100 + 0.0	0.9	0.85	0.81	0.77	0.74	0.71	0.65	**0.78**
2	25% + 30 B	0.77	0.71	0.69	0.65	0.62	0.6	0.58	**0.66**
3	50% + 30 B	0.81	0.78	0.74	0.73	0.69	0.65	0.61	**0.72**
4	75% + 30 B	0.89	0.87	0.82	0.79	0.75	0.71	0.67	**0.79**
5	25% + 30 N	0.78	0.75	0.72	0.68	0.65	0.6	0.57	**0.68**
6	50% + 30 N	0.87	0.85	0.82	0.79	0.76	0.73	0.7	**0.79**
7	75% + 30 N	0.89	0.86	0.83	0.8	0.77	0.73	0.7	**0.8**
8	25% + 30 R	0.84	0.81	0.78	0.76	0.73	0.69	0.66	**0.75**
9	50% + 30 R	0.91	0.88	0.84	0.81	0.78	0.75	0.73	**0.81**
10	75% + 30 R	0.91	0.88	0.86	0.83	0.81	0.77	0.75	**0.83**
	Mean	**0.86**	**0.82**	**0.79**	**0.76**	**0.73**	**0.69**	**0.66**	
L.S.D at 0.05= 0.06									

2.3. TSS / acid ratio.

The effect of cold storage on the TSS-Acid ratio is summarized in the Table (7). The ratio increased in all treatments during the cold storage. Maximum increase was gained by the treatment of 30g/vine Biogen plus 25% of mineral N, while the least value was for treatment of 30g/vine Rhizobacterine plus 50% of mineral N in comparison with all other treatments including the control. These results are in agreement with those of Hifny and Abdel-All (1977), Abdel-Hamid (2000) and Abdel Hamid *et al.* (2004) who reported that TSS/ acid ratio increased by prolonging cold storage period.

Table (7): Effect of nitrogen source on T.S.S / Acid ratio of Superior seedless grapevine under cold storage condition in2006 and 2007 seasons.

Ser. No.	Treatments g/tree	Storage period							
		2006							
	M.N + Bio	0	15	30	45	60	75	90	Mean
1	100 + 0.0	18	19	21	23	25	28	32	**23.7**
2	25% + 30 B	23	26	28	31	34	37	41	**31.4**
3	50% + 30 B	22	23	25	26	28	30	33	**26.7**
4	75% + 30 B	19	20	22	24	25	28	31	**24.3**
5	25% + 30 N	21	23	25	27	30	33	36	**27.9**
6	50% + 30 N	17	19	20	22	23	25	27	**21.9**
7	75% + 30 N	18	19	20	21	23	25	26	**21.7**
8	25% + 30 R	19	20	22	23	25	27	29	**23.6**
9	50% + 30 R	17	19	20	21	22	24	26	**21.3**
10	75% + 30 R	17	19	20	21	23	24	26	**21.4**
	Mean	**19.1**	**20.7**	**22.3**	**23.9**	**25.9**	**28.10**	**30.7**	
		2007							
1	100 + 0.0	18	19	21	23	34	20	29	**22.9**
2	25% + 30 B	23	25	27	29	31	33	35	**29.0**
3	50% + 30 B	21	23	25	25	28	30	32	**26.3**
4	75% + 30 B	19	20	22	23	25	27	29	**23.6**
5	25% + 30 N	21	22	23	25	27	30	32	**25.7**
6	50% + 30 N	19	20	21	23	24	25	28	**22.9**
7	75% + 30 N	18	19	20	21	23	25	26	**21.7**
8	25% + 30 R	19	20	21	23	24	26	28	**23.0**
9	50% + 30 R	18	19	20	22	23	24	26	**21.7**
10	75% + 30 R	18	19	20	22	22	24	25	**21.4**
	Mean	**19.4**	**20.6**	**22.0**	**23.6**	**25.1**	**27.0**	**29.0**	

REFERENCES

Abdel-Hady, A.M. (2003): Response of Flame seedless vines to application of some bio-fertlizers. Minia J. of Agric. Res & Develop. Vol. (23) No. 4 PP 667-680.

Abdel-Hamid, N. (2000): Pre-harvest application of some ethylene inhibitors delays "Crimson seedless grape ripening and improves storability, Annals Agric Sci, Ain Shams Univ. Cairo, 45(1). 295-314.

Abdel-Hamid, N; Selem, Sh. M.; Ghobreial, G.F. and Abd El-Azia, Kh. (2004): Effect of different Nitrogen doses and bio-fertilizers application on yield and quality of Crimson seedless grapes. . J. of Environ. Sci. Vol.(8), No.(3) PP 837-861.

Abdel-Wahab, S.M and El-Shinawy, I.E. (2004): Effect of some pre-harvest treatments on improving quality and storability of crimson seedless grapes. Annals of Agric. Sc. Moshtohor, Vol. 42(4). 1965-1981.

Abo Shanab E.S. (1977): Effect of Etherel on maturation and fruit quality of (*Vitis vinifera* L) M.Sc Thesis Fac. Agri. Ain Shams Univ., Egypt.

Agricultural Economic Bull, (2007). Ministry of Agriculture, Egypt.

Ahmed, F.F. Akl, A. M; El-Morsy, F.M. and Ragab, M.A. (1997): The beneficial effects of Biofertilizers on Red Roomy grapevines (*Vitis vinifera* L.) 1- The effect on growth and vine nutritional status. Annals of Agric. Sc. Moshtohor, Vol. 35 (1). 489-495.

Darwish, O.H.; Hanna, L.F.; Maatouk, M.A.; Ahmed, F.F. and Mohamed, G.A. (1996): Enhancing the availability of phosphorus as rock phosphate for Red Roomy grapevines by some materials. 2- Effect on productivity of quality of berries. Fourth Arabic Conf. for Hort. Crops. El-Minia Univ., Egypt. Part II. 969-995.

El-Shamaa, M.S. and Abd-El-Hady, A.M. (2001): Productive performance of Red Roomy grapevines as affected by biofertilization. Egypt. J. Appl. Sci., 16 (5).

Hifny, H.A.A., and Abdel- All, R.S. (1977): Effect of GA and CCC on physical and chemical changes in seedless grapes under cold storage conditions. Vitis 16 (1).27-31.

Kokkalos, T.I. (1986): Post harvest decay control of grapes by using sodium metabisulphite in cartons enclosed in plastic bags. Amer. J. Eno. Viticul 37(2). 149- 151.

Mansour, A.E.M (1998): Response of Anna apple to some biofertilizers. Egyptian Journal of Horticulture 25.2, 241-251.

Merelo, P. and Lizana, L.A.(1988): Effect of packing method, harvest date, rate and method of SO^2 application on rot incidence in cv Sultanina" Thompson seedless" table grape. Simiente, 58. 70- 78(Hort. Abst 59. 3765).

Shear, C.B. (1975): Calcium related disorder of fruit and vegetable. HortScince. 10 361-365.

Snedecor, G.W. and Chochran, W.G. (1968): Statistical Methods. 6th Edition., The Iowa State Univ. Press, Iowa, U.S.A.

Waller, H.R. and Duncan, D.B. (1969): Multiple range and multiple F- test. Biometrics, 11. 1- 42.

Wassel, A.M. (1985): Pre and post harvest techniques for preserving white Banati grape "*Vitis Vinifera* L" Minia J. Agric. Res. & Dev., 7(2). 789- 801.

تأثير مصدر النيتروجين علي جودة ثمارالعنب السوبريور تحت ظروف التخزين البارد

جمال عبدربه السيد ، احمد محمد عبدالرازق
قسم البساتين كلية الزراعة جامعة الازهر – القاهرة

تم اجراء هذ البحث خلال موسمي٢٠٠٦ و٢٠٠٧ على كرمات عنب صنف السوبريور عمر ٧ سنوات بغرض دراسة تأثير استخدام ثلاثة انواع من الأسمدة الحيوية وهي البيوجين ،النيتروبين والريزوبكيترين مع جرعات مختلفة من السماد المعدنى الأزوتى بمعدلات ٢٥و٥٠ و٧٥% من الكمية الموصى بها بلاضافة الى الكنترول (١٠٠% من الكمية الموصى بها من التسميد النيتروجينى) على جودة ثمارالعنب السوبريور تحت ظروف التخزين المبردعلى درجةالصفر المئوى. ولقد اشارت نتائج الدراسة الى:-

- ان استخدام البيوجين بمعدل ٣٠ جم للكرمة بالإضافة الى ٢٥% من السمادالمعدنى ادى الي تقليل النسبة المئوية للفقد فى الوزن بالمقارنة بالمعاملات الاخرى.
- ادى استخدام الريزوباكترين بمعدل ٣٠ جم للكرمة بالاضافة الى ٧٥% من السماد المعدنى الى افضل النتائج بالنسبة للحبات التالفة مقارنة بباقى المعاملات.
- استخدام النيتروبين بمعدل ٣٠ جم للكرمة بالاضافة الى ٢٥% من السماد المعدنى ادى لتقليل النسبة المئوية لفرط الحبات وكذالك الاحتفاظ بصلابتها مقارنة بباقى المعاملات.
- زادت النسبة المئوية للمواد الصلبة الذائبة وأيضا نسبة المواد الصلبة الذائبة /للحموضة الى اقصى درجة عند استخدام البيوجين بمعدل ٣٠ جم للكرمة بالاضافة الى ٢٥% من السماد المعدنى.
- انخفضت النسبة المئوية للحموضة فى الحبات الى اقل درجة عند استخدام البيوجين بمعدل ٣٠ جم للكرمة بالإضافة الى ٢٥% من السماد المعدنى.

يمكن القول أن ان استخدام البيوجين بمعدل ٣٠ جم للكرمة بالاضافة الى ٢٥% من السمادالمعدنى ادى الي الحصول على أفضل النتائج بالنسبة لجودة ثمارالعنب السوبريور تحت ظروف التخزين المبردعلى درجةالصفر المئوى بالمقارنة بالمعاملات الاخرى