J. Agric. Sci. Mansoura Univ., 32 (4) 2807 - 2816, 2007

EFFECT OF POTASSIUM AND MAGNESIUM FERTILIZATION ON VINE VIGOUR AND LEAF MINERAL CONTENT OF THOMPSON SEEDLESS GRAPE

Hassan, A. H.; A. M. Mansour and N. H. Samra
Pomology Dept., Fac. of Agric., Mansoura Univ.

ABSTRACT

This investigation was undertaken during seasons of 2005 and 2006 to study the effect of potassium and magnesium fertilization each alone or in combination on vine vigour, vegetative growth and leaf mineral content of Thompson Seedless grapevines.

Potassium was applied to the soil as potassium sulphate at 75, 150 and 225 g/vine. Also, magnesium was applied as magnesium sulphate at 0, 30 and 60 g/vine. Since, potassium and magnesium fertilization were applied in two equal doses one before bud burst and the second after fruit set.

From this study it is clear that, potassium fertilization at 150 g with 30 g magnesium sulphate increased both internodes length, thickness and trunk growth than the other treatments used or the control. Furthermore, potassium fertilization at 225 g with magnesium sulphate at 60 g per vine gave a higher leaf area than the other level of fertilization. The data also reveal that both potassium and magnesium fertilization increased the values of nitrogen, potassium and magnesium in leaf petiole, but reduced the level of phosphorus and calcium content in leaf petiole than the control.

INTRODUCTION

Grape (*Vitis vinifera*, L) is considered the first deciduous fruit crop in both area and production in all over the world and the second one in Egypt. The total area reached about 154685 feddans producing about 1391749 metric tons according to the last statistics of (Ministry of Agriculture, 2005).

Fertilization had an important effect on growth vigour, productivity of grapevine. In this respect, nitrogen is one of the major nutrients required by plants for sufficient growth. Increases in N application has resulted in increases in shoot growth, pruning weights, leaf area/vine, lateral shoot length and trunk girth (Martin *et al*., 2004). Also, increasing nitrogen concentration has increased phosphorus and iron levels while decreasing calcium and magnesium concentrations (Bell and Robson, 1999).

Potassium fertilization is very important for grapevine so, it is an activator of such enzymes that are essential for photosynthesis and respiration (Bhandal and Malik, 1988). The application of K can result in increasing vine growth increasing pruning weights, dry mass, shoots/vine, leaves/vine and trunk girth. Lack of K resulted in a decrease in crop yield and fruit weight (Conradie and Saayman, 1989).

Magnesium (Mg) is an essential component of chlorophyll and responsible for the activation of many enzymes in photosynthesis, respiration and the formation of DNA and RNA (Salisburg and Ross, 1992). Furthermore, an antagonism was observed with K and Mg, as the addition of K decreased

the concentration of Mg in the plant in the same manner as reported by (Wolf *et al*., 1983).

This investigation was undertaken during the seasons 2005 and 2006 to study the effect of potassium and magnesium as soil fertilization each alone or in combination on vine vigour and leaf mineral content of Thompson Seedless grapevine.

MATERIALS AND METHODS

This investigation was carried out during 2005 and 2006 seasons on 15-year-old of Thompson Seedless grapevines grown at EL-Dear village near Aga City, Dakahlia Governorate, Egypt. The vines were planted at 2 m between vines and 2.5 m between raws using cane-pruning under head trellis system.

At the beginning of this study, samples of soil were taken from (0-30 and 30-60 cm depths) at 4 different sites representing major parts of the root zone before adding any soil fertilization to soil analysis. Samples of each layer were completely mixed to measure physical and chemical characteristics of the soil and the obtained results are presented in Table (1).

For this study, 120 vines almost similar in vigor, productivity and subjected to the normal horticultural practices used in the farm. Factorial experimental design with complete randomized block design was used since, the vines chosen in 3 replicates; each replicate containing 4 vines represented one of each treatments under the study. Also, raw of vines received as borders between each replicate and block for our fertilization.

Table (1) : Soil physical and chemical characteristics :

A- Physical characteristic :		
Contents	(0-30 cm)	(30-60 cm)
Clay %	43.70	43.54
Silt %	40.63	40.85
Sand %	10.67	10.26
Organic matter %	1.45	2.14
$CaCO_3$	3.10	3.21
Texture class	Silty-clay	Silty-clay
B- Chemical characteristics : (Meq/L)		
Mg	6.14	7.11
Available K	0.42	0.49
pH	7.4	7.2
Salt conc. ppm	413	405

Soil fertilization was applied in a concentrated hand approximately 40 cm. on each side of the trunk through the row at 10-15 cm depth according to (Mannson and Nelson, 1963).

Potassium fertilization was applied in the soil as potassium sulphate (namely commercially Solucros) contains (50 % K_2O and 18 % S) at three rates (75, 150 and 225 g) of potassium sulphate in two equal doses, before

bud burst stage on March 10th 2004, March 5th 2005 and March 7th 2006 and after fruit set stage on May 18th 2004, May 15th 2005, May 11th 2006.

Magnesium fertilization was applied to the soil as magnesium sulphate (98.5 % $MgSO_4$) at three rates (0, 30 and 60 g magnesium sulphate per vine) and combined with potassium in the same time through the season.

Nitrogen fertilization at (60 units) was applied to the soil as ammonium nitrate (33.5 %) and added in three equal doses (20 unit of nitrogen/vine) after bud burst, fruit set and after harvesting time.

Whereas, super phosphate (15.5 % P_2O_5) was applied at (200 g super phosphate/vine) in one dose before bud burst stage during the three seasons of the study. Since, most of growers at this area adding potassium at very low amount and not adding magnesium through their fertilization programs.

In this respect, our treatments are presented in Table (2) :

Table (2) : The applied treatments :

Treatment	Potassium sulphate	Magnesium sulphate
1	75 g K_2O	---
2	75 g K_2O	30 g
3	75 g K_2O	60 g
4	150 g K_2O	---
5	150 g K_2O	30 g
6	150 g K_2O	60 g
7	225 g K_2O	---
8	225 g K_2O	30 g
9	225 g K_2O	60 g
10	Control *	

- Control treatment which received the normal fertilization used in the farm (60 units of nitrogen, 200 kg of super phosphate during the seasons). Also, these amounts were added to all vines under study during the season.

At full bloom stage the following parameters was determined :

1- Internode length :

From third base of the canes, internode length was measurement for each replicates and the average was expressed in (cm).

2- Internode thickness :

The internode thickness was determined in the same canes for each replicates and the average was expressed in (cm).

3- Leaf area :

Samples of 20 leaves from each replicate were taken from the six leave from the top to measure the average leaf area using planimeter and the average expressed as (cm^2).

Leaf nutrient content :

Samples of 24 leaf petioles were taken from opposite side of the clusters and cleaned with tap water, dried, grounded and digested to determine N, P, K, Ca and Mg content :

1- Total nitrogen %: it was determined by using micro-kjeldahl according to Pregle (1945).
2- Phosphorus % : it was estimated colourmetrically using the chorotannus-reduse molybdo phosphoric blue colour method in sulphoric system as described by (Jackson and Volk, 1968).
3- Potassium % : it was determined using flame photometer according to, Black (1960).
4- Calcium and magnesium % : it was determined by titration against versen solution (Na-EDTA) as described by U.S. Salinity Laboratory staff Anonymous, (1954).

Statistical analysis :

The obtained data were subjected to analysis of variance according to Snedecor and Cochran (1990) and means were separated by L.S.D at 5 % level.

RESULTS AND DISCUSSION

I- Effect of potassium and magnesium fertilization on vine vigor :

1- Internode length and thickness :

From Table (3) it is clear that all potassium and magnesium fertilization levels significantly increased both internode length and thickness than the control during the two seasons. The internode length was generally affected by both potassium or magnesium fertilization. So, potassium fertilization at 150 g with 30 g magnesium sulphate gave longer internodes than the other applications or the control. The increment in internode length due this treatment was about 30.2 % higher than the control as the mean of two seasons. Yet, potassium fertilization at 225 g without magnesium sulphate gave shorter internodes than the other fertilization used. The increment due this treatment was about 8.2 % longer than the control.

In this respect, Abdel-Mohsen (2003) presented that the longest internodes were for higher N-particularly when considering the interaction with NPK at higher K level, since vines grown under 1:1:3 NPK developed shoots with longer internodes while those under 1:1:2 had the shortest ones. So, cane thickness was significantly increased by increasing N-rate from 50 to 70 kg/fed.

Regarding the effect of potassium and magnesium fertilization on internode thickness, data from the same table show that all treatments significantly increased the internode thickness than the control. Moreover, potassium fertilization at 150 g with magnesium application at 30 g presented a higher significant effect than the other levels of potassium and magnesium fertilization. So, the increment of internode thickness was about 44.4 % higher than the control as mean of two seasons. Whereas, potassium sulphate at 75 g/vine without magnesium fertilization gave lower internode in thickness than the other fertilization used. The increment due to this treatment was about 6.0 % than the control as a mean of two seasons.

Similar results were found by Rizk and Rizk (1994) who found that spraying Thompson Seedless vines with chelated magnesium at 0.3 % increased internode thickness and gave the highest number of leaves per shoot.

Table (3): Effect of potassium and magnesium fertilization on internode length and thickness of Thompson Seedless grape.

Treatment		Internode length (cm)			Internode thickness (cm)		
		2005	2006	Mean	2005	2006	Mean
K_2O 75 g	Mg(0)	6.82	7.72	7.27	1.26	1.55	1.41
	Mg(30)	6.54	7.03	6.79	1.23	2.13	1.68
	Mg(60)	7.23	8.07	7.65	1.21	2.21	1.71
K_2O 150 g	Mg(0)	7.30	6.90	7.10	1.32	2.05	1.69
	Mg(30)	8.30	7.99	8.2	1.70	2.13	1.92
	Mg(60)	6.84	7.16	7.00	1.56	2.04	1.80
K_2O 225 g	Mg(0)	6.90	6.64	6.77	1.38	1.95	1.67
	Mg(30)	6.96	7.66	7.31	1.61	1.93	1.77
	Mg(60)	7.27	7.54	7.41	1.43	1.53	1.48
Control		6.14	6.37	6.26	1.14	1.51	1.33
L.S.D at 5 % K:		0.45	0.37	---	0.07	0.10	
L.S.D at 5 % Mg:		0.45	0.37	---	0.07	0.10	---
Inter. K x Mg:		0.73	0.62	---	0.11	0.17	---

-Potassium was applied as g potassium sulphate (Solucros contain 50% K_2O and 18% S).
- Magnesium was applied as g magnesium sulphate (China contain 98.5% $MgSO_4$).

2- leaf area :

Data from Table (4) show clearly that potassium application with or without magnesium fertilization significantly increased the values of leaf area than the control. Furthermore, Potassium fertilization at 225 g with magnesium sulphate at 60 g gave higher values of average leaf area during the both seasons. The increment obtained from this treatment was about 16.8 % than the control as a mean of both seasons. The data also presented that the effect of various levels of potassium and magnesium fertilization on leaf area during both seasons was unpronounced but almost higher than those obtained from the control. Similarly, Abdel-Mohsen (2003) found that increasing N-rate resulted in an obvious increase in leaf area associated with higher N-rate compared with the lower one. Also, the effect due NPK was statistically confirmed as 1:1:3 since the former produced leaves greater than the later by about 5.93 and 8.24 % in both seasons, respectively. Whereas, Matter (2003) found that average leaf area of Thompson Seedless grape was increased by increasing potassium fertilization. Since, potassium fertilization at 150 g/vine produced higher values of leaf area than 50 or 100 g potassium/vine.

3- Trunk thickness :

It is obvious from Table (4) trunk thickness was increased from season to season. Since, the values during the second season was almost

higher than those obtained from the first one. In this respect, trunk growth could be taken as an indicator for the vigor of vine canopy.

With regard to the effect of potassium and magnesium fertilization on average trunk thickness; the data found that all potassium and magnesium fertilization significantly increased the values of trunk thickness than the control. Furthermore, potassium fertilization at (150 g potassium sulphate) without magnesium fertilization gave higher values of trunk thickness than the other treatments or the control. The increment in trunk thickness due this treatment was about 26.9 % over the control as a mean of two seasons under study.

Yet, potassium fertilization at 75 g potassium sulphate alone gave loss thickness of trunk during both seasons, but higher than the control. The increment due this treatment ranged about 16.6 % as a mean of the two seasons. Also, Matter (2003) reported that the increment in trunk thickness was higher by increasing the level of potassium fertilization. Therefore, potassium fertilization at 150 g/vine, gave a more increment than at 50 or 100 g potassium/vine.

Table (4) : Effect of potassium and magnesium fertilization on leaf area and trunk thickness of Thompson Seedless grape.

Treatment		Leaf area (cm^2)			Trunk thickness (cm)		
		2005	2006	Mean	2005	2006	Mean
K_2O 75 g	Mg(0)	167.5	171.2	169.4	3.91	4.24	4.08
	Mg(30)	163.4	171.1	167.3	3.71	4.72	4.22
	Mg(60)	163.0	177.5	170.3	4.10	4.56	4.33
K_2O 150 g	Mg(0)	158.0	172.8	165.4	4.02	4.86	4.44
	Mg(30)	161.9	179.2	170.6	3.99	4.60	4.30
	Mg(60)	166.0	176.0	171.0	4.11	4.23	4.17
K_2O 225 g	Mg(0)	161.5	176.0	168.8	3.96	4.52	4.24
	Mg(30)	159.7	181.5	170.6	4.11	4.38	4.25
	Mg(60)	167.9	181.7	174.8	4.01	4.39	4.20
Control		145.6	153.6	149.6	3.33	3.67	3.50
L.S.D at 5 % K:		5.10	4.35	---	0.17	0.19	---
L.S.D at 5 % Mg:		5.10	4.35	---	0.17	0.19	---
Inter. K x Mg:		8.41	7.15	---	0.40	0.35	---

- Potassium was applied as g potassium sulphate (Solucros contain 50% K_2O and 18% S).
- Magnesium was applied as g magnesium sulphate (China contain 98.5% $MgSO_4$).

4- Leaf mineral content :

Data from Table (5) presented the effect of both potassium and magnesium fertilization on the content of N, P, K and Mg on leaf petioles of Thompson Seedless grape during the growing season under the study.

From these data it is clear that increasing the amount of potassium fertilization increased N in leaf petiole during both seasons of the study. Yet, both potassium and magnesium fertilization increased N content in leaf petioles. Furthermore, potassium fertilization at 225 g potassium sulphate without magnesium sulphate gave a higher N content than the other levels of

potassium fertilization. In this respect, potassium application at 225 g without magnesium sulphate produced higher and pronounced values than the other treatments used. Since, these treatments gave 19.0 % increment of N content than those obtained from the control as mean of the two seasons. Whereas, potassium sulphate at 150 g without adding magnesium gave a lower N content than the other treatments used, but almost higher than the control. In this respect, (Ahlawat and Yamdagni, 1988) indicated that leaf N content of Perlette vine was increased by increasing K application (0, 150 or 300 g K/vine).

Concerning the effect of these treatments on phosphorus, it is obvious from the same table that potassium fertilization at 150 or 225 g with magnesium application at 30 g magnesium sulphate per vine reduced the amount of P content in leaf petioles of Thompson Seedless grape than the other treatments used. Potassium sulphate each alone without adding magnesium sulphate gave a higher values of phosphorus in leaf petioles than the other treatments or the control. Similarly, Matter (2003) present that total nitrogen in leaf petioles of Thompson Seedless grapevines was gradually increased by increasing the amount of potassium fertilization. Also, phosphorus percentage and potassium contents in leaf petioles were increased by increasing potassium fertilization. So, potassium fertilization at 150 g/vine significantly increased the percentage of nitrogen, phosphorus and potassium in leaf petioles than added at 100 or 50 g K_2O/vine.

Table (5): Effect of potassium and magnesium fertilization on N, P and K leaf content % of Thompson Seedless grape.

Treatment		Nitrogen %			Phosphorus %			Potassium %		
		2005	2006	Mean	2005	2006	Mean	2005	2006	Mean
K_2O 75 g	Mg(0)	1.162	1.180	1.171	0.321	0.464	0.393	0.930	1.014	0.972
	Mg(30)	1.156	1.183	1.170	0.304	0.404	0.369	1.028	0.920	0.974
	Mg(60)	1.151	1.214	1.183	0.270	0.342	0.306	1.056	1.041	1.049
K_2O 150 g	Mg(0)	1.199	1.112	1.156	0.286	0.470	0.378	0.928	0.973	0.951
	Mg(30)	1.110	1.280	1.195	0.237	0.332	0.285	0.944	1.103	1.024
	Mg(60)	1.235	1.144	1.190	0.270	0.363	0.317	1.042	1.140	1.091
K_2O 225 g	Mg(0)	1.277	1.250	1.264	0.220	0.560	0.390	0.958	0.941	0.950
	Mg(30)	1.199	1.224	1.212	0.237	0.343	0.290	0.989	1.082	1.036
	Mg(60)	1.293	1.183	1.238	0.270	0.440	0.355	1.140	1.200	1.170
Control		1.053	1.070	1.062	0.324	0.410	0.367	0.858	0.890	0.874
L.S.D at 5 % K:		0.07	0.02	---	0.01	0.02	---	0.02	0.02	---
L.S.D at 5% Mg:		0.07	0.02	---	0.01	0.02	---	0.02	0.02	---
Inter. K x Mg:		0.11	0.03	---	0.03	0.03	---	0.04	0.03	---

- Potassium was applied as g potassium sulphate (Solucros contain 50% K_2O and 18% S).
- Magnesium was applied as g magnesium sulphate (China contain 98.5% $MgSO_4$).

With regard to the effect of potassium and magnesium fertilization on the content of potassium in leaf petioles, data indicated that all treatments used significantly increased the values of potassium on leaf petioles than the control during the two seasons. Similarly, Shikhamany *et al*. (1988) reported that when potassium sulphate was applied at (0, 500, 1000 and 1500 kg/ha/yr) to Thompson Seedless vine, the application of 1500 kg K_2O/ha presented a significant higher potassium content in petioles when compared

to the application of 500 kg. Also, Huang *et al*. (1992) suggested that K contents in the leaf of Muscat Hamburg grape was increased by applying potassium chloride alone or in combination with N and P.

Furthermore, increasing the amount of potassium fertilization from 75 to 225 g per vine presented a higher content of potassium than obtained from the lower level of potassium fertilization. In this respect, potassium fertilization at 225 g with magnesium sulphate with 60 g/vine presented a higher significantly values of potassium in leaf petioles than the other treatments used or the control. So, this treatment increased the level of potassium to 33.9 % over the control as a mean of two seasons under the study. Whereas, potassium fertilization at 225 g each alone without adding magnesium sulphate gave a lower values of potassium content than the other treatments used but also higher than the control.

Regarding to the effect of potassium and magnesium fertilization on Ca and Mg contents data from Table (6) reveal that both Ca and Mg in leaf petioles of Thompson Seedless grape were significantly reduced by potassium and magnesium fertilization than the control. Furthermore, potassium fertilization at 225 g/vine each alone without magnesium fertilization gave higher values of Ca content than the other treatments used but almost lower than the control. Whereas, potassium fertilization at 75 g with 30 g magnesium sulphate gave a lower values of Ca content in leaf petioles than the other treatments and the control.

Table (6): Effect of potassium and magnesium fertilization on Ca and Mg leaf content % of Thompson Seedless grape.

Treatment		Ca			Mg		
		2005	**2006**	**Mean**	**2005**	**2006**	**Mean**
K_2O 75 g	Mg(0)	0.634	0.663	0.649	0.457	0.572	0.515
	Mg(30)	0.668	0.600	0.634	0.527	0.560	0.544
	Mg(60)	0.695	0.682	0.689	0.587	0.593	0.590
K_2O 150 g	Mg(0)	0.582	0.700	0.641	0.444	0.511	0.478
	Mg(30)	0.656	0.720	0.688	0.489	0.554	0.522
	Mg(60)	0.720	0.740	0.730	0.588	0.563	0.576
K_2O 225 g	Mg(0)	0.826	0.662	0.744	0.587	0.583	0.585
	Mg(30)	0.833	0.640	0.737	0.509	0.580	0.545
	Mg(60)	0.733	0.704	0.719	0.612	0.572	0.592
Control		0.761	0.750	0.756	0.622	0.611	0.617
L.S.D at 5 % K:		0.02	0.01	---	0.01	0.02	---
L.S.D at 5 % Mg:		0.02	0.01	---	0.01	0.02	---
Inter. K x Mg:		0.03	0.02	---	0.02	0.03	---

- Potassium was applied as g potassium sulphate (Solucros contain 50% K_2O and 18% S).
- Magnesium was applied as g magnesium sulphate (China contain 98.5% $MgSO_4$).

In this respect, potassium fertilization at 225 g with magnesium sulphate at 60 g/vine gave a higher values of Mg content in leaf petioles than the other treatments used but lower than the control. Whereas, potassium

sulphate at 150 g without magnesium fertilization gave a lower values of Mg in leaf petioles than the other treatments used or the control during the two seasons under the study. In this respect, Matter (2003) presented that the content of Ca and Mg in leaf petioles of Thompson Seedless grapevines were significantly decreased by increasing potassium fertilization. In this respect, adding 150 g K_2O/vine gave a significant decrease in Ca and Mg than 50 or 100 g K_2O/vine under the two seasons of the study. Furthermore, Omar (1994) reported that all potassium applications induced a significant decrease in calcium and magnesium contents. The more effective dosage of K_2O was 50 kg when applied in March which achieved the lowest values of Ca and Mg % in leaf petioles. This may be due to the competition of uptake among K, Ca and Mg ions.

REFERENCES

Abd EL-Mohsen, M.A. (2003). The effect of fertilization rate and timing on Flame Seedless grapevines. Ph.D. Thesis, Fac. Agric. Cairo Univ., Egypt.

Ahlawat, V.P. and R. Yamdagni (1988). Effect of various levels of nitrogen and potassium application on growth, yield and petiole composition of grapes cv. Perlette. Progressive Hort., 20(3-4): 190-196. (Hort. Abst., 61: 9922).

Anonymous (1954). Diagnosis and improvement of saline and alkaline soils. U.S. Dept. of Agric. Hand book No. 60-94.

Bell, S. and A. Robson (1999). Effect of nitrogen fertilization and growth, canopy density and yield of (*Vitis vinifera*, L.) cv. Cabernet Sauvignon. Amer. J. Enol. Vitic., 50 (3): 351-358.

Bhandal, J.S. and C.P. Malik (1988). Potassium estimation, uptake and its role in the physiology and metabolism of flowering plants. International Review of Cytology, 110: 205-254.

Black, C.A. (1960). Soil-Plant Relationships. Proc. Amer. Sec. Inc. pp. 305-314.

Conradie, W.J. and D. Saayman (1989). Effect of long term nitrogen, phosphorus and potassium fertilization on Chenin Blanc vines. I. Nutrient demands and vines performance. Amer. J. Enol. Vitic., 40(2): 85-90.

Huang, X.G.; Z. Zhong; W.L. Deng and C.S. Wang (1992). Experiments on the application of potassium chloride plus N and P for grapevines. Choina Fruits, 2: 7-10.

Jackson, W.A. and R.J. Volk (1968). Role of potassium in photosynthesis and respiration. Amer. Soc. of Agronomy, Madison, Wis., pp. 109-145.

Mannson, R.D. and W.L. Nelson (1963). Movement of applied potassium in soil. Agric. and Food Chemis., 11(3): 193-201.

Martin, P.; R. Delgado; M.R. Gonzalez and J.I. Gallegos (2004). Colour of "Tempranillo" grapes as affected by different nitrogen and potassium fertilization rates. Acta Hort., 652: 153-159.

Matter, U.S. (2003). Studies on fertilization and summer pruning on grapes. Ph.D. Thesis, Fac. Agric. Mansoura Univ., Egypt.

Omar, A.H. (1994). Physiological studies on nutrition grapes (*Vitis vinifera*, L.). Ph.D. Thesis, Menofiya Univ., Shebin EL-Kom, Egypt.

Pregle, F. (1945). Quantitative Organic Micro-Analysis, 4th Ed. J.A. Churchill, Ltd., London. P. 126-129.

Rizk, A. and N.I. Rizk (1994). Performance of drip-irrigated Thompson Seedless grapevines in sandy soil supplemented with magnesium sulphate. Egypt. J. Appl. Sci., 9(4): 167-183.

Salisburg, F.B. and C.W. Ross (1992). Plant Physiology. 4th Ed. Wadsworth Publishing Company, USA.

Shikhamany, S.D.; R.C. Chelvan and K.L. Chadha (1988). Effect of varying levels of nitrogen and potash on petiole nutrient contents in Thompson Seedless grape (*Vitis vinifera*, L.). Indian, J. of Hort., 45(3): 180-188.

Snedecor, G.W. and G.W. Cochran (1990). Statistical Methods. 7th Ed. The Lowa state Univ., Iowa, USA, p.593.

Wolf, T.K.; C.W. Heaseler and E.L. Bergman (1983). Growth and foliar elemental composition of seyvel Blanc grapevines as affected by four nutrient solution concentration of nitrogen, potassium and magnesium. Amer. J. of Enol. Vitic., 34 (4): 271-277.

تأثير التسميد بكل من البوتاسيوم والماغنسيوم على قوة النمو والمحتوى المعدنى لأوراق العنب البناتى

عبد العال حجازى حسن , عبد الفتاح محمود منصور و نشأت حلمى أبو سمرة
قسم البساتين – كلية الزراعة – جامعة المنصورة

أجريت هذه التجربة خلال موسمين ٢٠٠٥ - ٢٠٠٦ لدراسة أثر التسميد بكل من البوتاسيوم والماغنسيوم على النمو الخضرى (طول و سمك القصبات – المساحة الورقية) وكذا التغير فى سمك جذوع الكرمات وكذا محتوى أعناق أوراق العنب البناتى من العناصر.

لقد أوضحت الدراسة أن اجراء التسميد بسلفات البوتاسيوم بمعدل ١٥٠ جم و كذا سلفات الماغنسيوم بمعدل ٣٠ جم للكرمة أعطى زيادة واضحة فى طول و سمك السلاميات علاوة على زيادة واضحة فى سمك جذوع الكرمات فى حين أدى التسميد بمعدل ٢٢٥ جم سلفات بوتاسيوم و كذا ٦٠ جم سلفات ماغنيسيوم إلى زيادة واضحة فى المساحة الورقية بالمقارنة بباقي المعاملات الأخرى .

علاوة على ما سبق فان التسميد بكل من البوتاسيوم و الماغسيوم اظهر زيادة فى محتوى أعناق الأوراق من النتروجين و البوتاسيوم و الماغسيوم بينما أدى لخفض محتوى أعناق الأوراق من الفوسفور و الكالسيوم .