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**THE SYNERGISTIC EFFECTS OF USING B VITAMINS WITH
THE TWO AMINO ACIDS TRYPTOPHANE AND METHIONENE
IN THOMPSON SEEDLESS GRAPEVINES**

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ABSTRACT

The effect of single and combined application of B vitamins ($B_1 + B_2 + B_3 + B_{12}$) at 50 ppm as well as two amino acids, tryptophane and methionene, each at 50 ppm on fruiting of Thompson seedless grapevines were investigated during 2010 and 2011 seasons.

Results showed that single and combined applications of vitamins B and the two amino acids were very effective in improving leaf area, percentages of N, P, K and Mg in the leaves, yield and quality of the grapes comparing with non- application. Application of amino acids was superior than the application of vitamins B in this respect. Application of vitamins B enriched with amino acids was preferable than using each alone in this connection.

Three sprays of a mixture containing B vitamins ($B_1 + B_2 + B_3 + B_{12}$) at 50 ppm as well as the two amino acids tryptophane and methionene each at 50 ppm proved to be very effective in improving yield quantitatively and qualitatively of Thompson seedless grapevines.

INTRODUCTION

Recently, it was suggested that vitamins and amino acids participate in plant growth and development indirectly by enhancing the endogenous levels of various growth factors such as cytokinins and gibberellins. They are synthesized in the leaves and translocated in the phloem. For more than two decades, study of the role of these antioxidants in plants attracted sporadic attention. These studies indicated that various physiological processes such as nutrient uptake, respiration, photosynthesis as well as chlorophyll and protein synthesis depend more or less on the availability of these antioxidants (Samiullah *et al.*, 1988 and Tzeng and Devay, 1989). Several workers confirmed the promotive effect of B vitamins (Ahmed and Seleem-Basma, 2008; Abd El- Kariem, 2009; Abada and Abd El- Hameed, 2009; Ahmed *et al.*, 2010; El- Hanafy, 2011 and Wassel *et al.*, 2011) and amino acids (Ahmed and Abd El- Hameed, 2003; Ahmed *et al.*, 2007; Amin, 2007 and Seleem- Basma and Abd El- Hameed, 2008) on fruiting of different grapevine cvs.

The objective of this study was examining the impact of B vitamins as well as the two amino acids tryptophane and methionene either applied solitary or applied in various combinations on fruiting of Thompson seedless grapevines.

MATERIALS AND METHODS

This study was conducted during 2010 and 2011 seasons on 80 uniform in vigour 16- years old head trained Thompson seedless grapevines grown in a private vineyard located at Samalout district, Minia Governorate. The texture of soil is silty clayp; vine load for all selected vines was adjusted to 44 eyes (10 fruiting spurs × six eyes plus six replacement spurs × two eyes). The vines were planted at 2 × 2 meters apart. Surface irrigation system was followed. All selected vines received the common horticultural practices that are already applied in the vineyard except those dealing with the application of vitamins B and amino acids.

The experiment included the following eight treatments:

- 1- Control (untreated vines).

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- ٢- Spraying B vitamins (B₁+ B₂+ B₆+ B₁₂) at ٥٠ ppm.
- ٣- Spraying tryptophane at ٥٠ ppm.
- ٤- Spraying methionene at ٥٠ ppm.
- ٥- Spraying tryptophane + Methionene each at ٥٠ ppm.
- ٦- Spraying tryptophane + B vitamins each at ٥٠ ppm.
- ٧- Spraying methionene + B vitamins each at ٥٠ ppm.
- ٨- Spraying tryptophane + Methionene + B vitamins each at ٥٠ ppm.

Each treatment was replicated three times, two vines per each. B-vitamins and the two amino acids were sprayed three times during each season; at growth start (mid. of Mar.), just after berry setting (last week April) and at one month later (last week of May). Triton B as a wetting agent was added at ٠.٠٥ % to all treatments including the check treatment. Spraying was done till runoff. Complete randomized block design was followed.

Leaf area (cm²) (according to Ahmed and Morsy, ١٩٩٩) and percentages of N, P, K and Mg in the leaves (according to Chapman and Pratt, ١٩٦٥ and Balo *et al.*, ١٩٨٨) were determined. At harvesting date (mid. July), number of clusters/ vine as well as yield expressed in weight (kg.) per vine were recorded. Five cluster/ vine were taken for measuring cluster weight (g.), berry weight (g.), total soluble solids total sugars and total acidity expressed as g tartaric acid/ ١٠٠ ml juice (A.O.A.C, ١٩٩٥).

The proper statistical analysis was done using new L.S.D at ٥ % for doing all possible differences among the different treatments (according to Mead *et al.*, ١٩٩٣).

RESULTS AND DISCUSSION

Leaf area and its content of N, P, K and Mg:-

It is clear from the data in Table ١ that varying B vitamins and amino acid treatments had significant effect on leaf area and percentages of N, P, K and Mg in the leaves compared with the control (non- application. Application of tryptophane and methionene were superior than the application of B vitamins in stimulating leaf area and the content of nutrients.

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Table 1: Effect of some B vitamin and amino acid treatments on the leaf area and its content of N, P, K and Mg and number of clusters/ vine of Thompson seedless grapevines during 2010 and 2011 seasons.

Treatment	Leaf area		Leaf N %		Leaf P %	
	2010	2011	2010	2011	2010	2011
Control	138.0	141.0	1.02	1.09	0.16	0.17
B vitamins at 0.0 ppm	140.0	143.0	1.08	1.76	0.19	0.20
Tryptophane at 0.0 ppm	141.7	140.0	1.70	1.71	0.22	0.23
Methionene at 0.0 ppm	143.0	147.0	1.70	1.80	0.26	0.27
Tryptophane + Methionene	140.7	148.9	1.81	1.87	0.29	0.30
Tryptophane + B vitamins	147.0	101.0	1.89	1.94	0.33	0.33
Methionene + B vitamins	100.0	103.0	1.90	2.01	0.36	0.30
Tryptophane + Methionene + B vitamins	104.0	100.0	2.00	2.09	0.40	0.41
New L.S.D at 0.0 %	1.1	1.3	0.06	0.06	0.03	0.03
Character	Leaf K %		Leaf Mg%		No. of clusters/ vine	
	2010	2011	2010	2011	2010	2011
Control	1.33	1.34	0.29	0.30	23	24
B vitamins at 0.0 ppm	1.39	1.37	0.33	0.33	23	20
Tryptophane at 0.0 ppm	1.42	1.41	0.37	0.36	23	27
Methionene at 0.0 ppm	1.48	1.40	0.41	0.40	23	29
Tryptophane + Methionene	1.00	1.00	0.40	0.44	23	29
Tryptophane + B vitamins	1.71	1.00	0.48	0.49	23	30
Methionene + B vitamins	1.77	1.71	0.02	0.02	24	31
Tryptophane + Methionene + B vitamins	1.73	1.71	0.06	0.00	24	33
New L.S.D at 0.0 %	0.00	0.04	0.03	0.03	NS	1.6

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The promotion was associated with using the two amino acids along with B vitamins comparing with using each alone. The maximum values were recorded on using B vitamins and the two amino acids (tryptophane and methionene) each at 0.5 ppm; untreated vines had the minimum values. These results were true during 2010 and 2011 seasons.

The promoting effect of B vitamins and amino acids as antioxidants on enhancing cell division, root development and uptake of different nutrients (Samiullah *et al.*, 1988 and Tzeng and Devay, 1989) explained the present results.

These results are in harmony with those obtained by Abd El-Kariem (2009); Abada and Abd El-Hameed (2009) and Wassel *et al.*, (2011) on B vitamins and Ahmed *et al.*, (2007); Amin (2007) and Seleem- Basma and Abd El-Hameed (2008) on amino acids.

Yield/ vine :-

Data in Tables 1 and 2 clearly show that single and combined applications of B- vitamins and the two amino acids each at 0.5 ppm were significantly very effective in improving the yield expressed as number of clusters/ vine and weight (kg.) compared with the control treatment. In the first season of study, number of clusters per vine did not change significantly with the present treatments. Using two amino acids was significantly preferable than using B- vitamins in improving the yield. Combined application of B- vitamins with the two amino acids surpassed the application of each alone in this respect. The highest yields (8.2 and 11.6 kg per vine) during both seasons were recorded on using B vitamins and the two amino acids together. Untreated vines gave the minimum values (6.2 and 6.0 kg during both seasons, respectively). These results were true during both seasons. The positive action of these antioxidants on growth and vine nutritional status surely reflected on enhancing vine production. These results are in harmony with those obtained by Abd El- Kariem (2009); Abada and Abd El- Hameed (2009) and Wassel *et al.*, (2011) on B vitamins and Ahmed *et al.*, (2007); Amin (2007) and Seleem- Basma and Abd El- Hameed (2008) on amino acids.

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Table ٧: Effect of some B vitamin and amino acid treatments on the yield, cluster weight as well as some physical and chemical characteristics of the grapes of Thompson seedless grapevines during ٢٠١٠ and ٢٠١١ seasons.

Treatment	Yield/ vine (kg.)		Cluster weight (g.)		Berry weight (g.)	
	٢٠١٠	٢٠١١	٢٠١٠	٢٠١١	٢٠١٠	٢٠١١
Control	٦.٢	٦.٥	٢٧٠.٠	٢٧٢.٠	١.٤٥	١.٤٧
B vitamins at ٥٠ ppm	٦.٥	٧.١	٢٨١.٠	٢٨٥.٠	١.٥٠	١.٥٥
Tryptophane at ٥٠ ppm	٦.٦	٧.٩	٢٨٩.٠	٢٩٣.٠	١.٥٦	١.٦٤
Methionene at ٥٠ ppm	٦.٩	٨.٨	٣٠٠.٠	٣٠٥.٠	١.٦٢	١.٧١
Tryptophane + Methionene	٧.١	٩.٣	٣٠٩.٠	٣١٩.٠	١.٧٠	١.٨٠
Tryptophane + B vitamins	٧.٣	٩.٩	٣١٩.٠	٣٢٩.٠	١.٧٥	١.٨٥
Methionene + B vitamins	٧.٩	١٠.٤	٣٢٩.٠	٣٣٤.٠	١.٨٠	١.٨٧
Tryptophane + Methionene + B vitamins	٨.٢	١١.٦	٣٤١.٩	٣٥٠.٠	١.٨٨	١.٩٠
New L.S.D at ٥ %	٠.٣	٠.٥	١١.٠	١٢.٠	٠.٠٥	٠.٠٦
Character	T.S.S %		Total sugars %		Total acidity %	
Control	١٨.٠	١٨.٢	١٦.٠	١٦.١	٠.٦٨٠	٠.٦٩١
B vitamins at ٥٠ ppm	١٨.٤	١٨.٦	١٦.٣	١٦.٤	٠.٦٦٠	٠.٦٥٨
Tryptophane at ٥٠ ppm	١٨.٨	١٩.٩	١٦.٦	١٦.٧	٠.٦٤٠	٠.٦٣٨
Methionene at ٥٠ ppm	١٩.٢	١٩.٤	١٧.٠	١٧.١	٠.٦٢٠	٠.٦١٦
Tryptophane + Methionene	١٩.٦	١٩.٨	١٧.٣	١٧.٤	٠.٦٠٠	٠.٥٩٠
Tryptophane + B vitamins	٢٠.٠	٢٠.٣	١٧.٦	١٨.٠	٠.٥٥٠	٠.٥٤٠
Methionene + B vitamins	٢٠.٣	٢٠.٦	١٨.١	١٨.٣	٠.٥٠٢	٠.٥٠٠
Tryptophane + Methionene + B vitamins	٢٠.٦	٢١.٠	١٨.٤	١٨.٦	٠.٤٨٠	٠.٤٧١
New L.S.D at ٥ %	٠.٣	٠.٣	٠.٢	٠.٢	٠.٠١٨	٠.٠١٩

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Some physical and chemical characteristics of the berries:

It is evident from the data in Table 3 that single and combined applications of B- vitamins as well as the two amino acids significantly were responsible for improving the physical and chemical characteristics of the grapes in terms of increasing berry weight, total soluble solids and total sugars and reducing total acidity compared with the control treatment. Combined applications of these antioxidants had significant effect on quality of the grapes. Using amino acids was superior than using B vitamins in this respect. The best results with regard quality were obtained due to using B- vitamins along with the two amino acids each at 20 ppm. Unfavourable effects on quality parameters were obtained from untreated vines. Similar trend was observed during both seasons. The beneficial effect of these antioxidants on the biosynthesis and translocation of sugars (Samiullah *et al.*, 1988) could result in enhancing grapes quality . These results are in harmony with those obtained by Abd El- Kariem (2009); Abada and Abd El- Hameed (2009) and Wassel *et al.*, (2011) on B vitamins and Ahmed *et al.*, (2007); Amin (2007) and Seleem-Basma and Abd El- Hameed (2008) on amino acids.

As a conclusion, it is advisable to use B vitamins and the two amino acids together three times each at 20 ppm to promote yield quantitatively and qualitatively.

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التأثيرات المشتركة لاستخدام فيتامينات B مع إثنان من الأحماض
الأمينية هما الترتوفان والميثيونين علي كرمات العنب الطومسون
سيدلس"

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**المعمل المركزي للزراعة العضوية - الجيزة - مصر.

تم دراسة التأثير الفردي والمشارك لاستخدام فيتامينات B (ب₁ + ب₂ + ب₆)
ب وكذلك الحامض الأميني الترتوفان والميثيونين بتركيز ٥٠ جزء في المليون علي
الإثمار في العنب الطومسون سيدلس خلال موسمي ٢٠١٠، ٢٠١١.
أشارت نتائج الدراسة إلي أن الاستخدام الفردي والمشارك لفيتامينات B والحامض
الأميني الترتوفان والميثيونين كان فعالا جدا في تحسين مساحة الورقة والنسب المئوية
لعناصر النيتروجين والفسفور والبوتاسيوم والمغنيسيوم في الأوراق وكمية المحصول وجودة
الحبات وذلك بالمقارنة بعدم الاستخدام وكان استخدام الاحماض الأمينية مفضلا عن
استخدام فيتامينات B في هذا الصدد وكان استخدام فيتامينات B جنبا الي جنب مع
الأحماض الأمينية مفضلا عن استخدام كل منهما بمفرده في هذا الصدد.
كان استخدام ثلاثة رشات من مخلوط يحتوي علي فيتامينات B (ب₁ + ب₂ + ب₆)
+ جنبا الي جنب مع الحامض الأميني الترتوفان والميثيونين بتركيز ٥٠ جزء في
المليون فعالا في تحسين كمية المحصول كما ونوعا في العنب الطومسون سيدلس.