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PRODUCTIVITY OF THOMPSON SEEDLESS GRAPEVINES AS INFLUENCED BY APPLICATION OF SOME ANTIOXIDANT AND NUTRIENT TREATMENTS

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ABSTRACT

During ٢٠١٠ and ٢٠١١ seasons, Thompson seedless grapevines were sprayed three times with four antioxidants (vitamins B at ٢٥ ppm, ascorbic acid at ٥٠٠ ppm, salicylic acid at ٥٠ ppm and citric acid at ٥٠٠ ppm) as well as boric acid at ٠.٠٢٥ % and magnesium sulphate at ٠.٢٥ % either alone or in all possible combinations.

Single and combined applications of the four antioxidants and the two nutrients practically were responsible for improving yield and both physical and chemical characteristics of the berries compared with the control. The promotion effect was associated with using vitamins B complex (B_1 + B_2 + B_6 +B_{12}) at ٢٥ ppm, ascorbic acid at ٥٠٠ ppm, salicylic acid at ٥٠ ppm, citric acid at ٥٠٠ ppm, boric acid at ٠.٠٢٥ % and magnesium sulphate at ٠.٢٥ %, in the ascending order, respectively.

Treating Thompson seedless grapevines grown under Minia region with the four antioxidants (B vitamins at ٢٥ ppm, ascorbic acid at ٥٠٠ ppm, salicylic acid at ٥٠ ppm and citric acid at ٥٠٠ ppm) and the two nutrients namely boric acid at ٠.٠٢٥ % and magnesium sulphate at ٠.٢٥ % three times gave the best results with regard to yield and quality of the berries.

INTRODUCTION

Improving physical and chemical characteristics of grape Thompson seedless cv. is considered an important target for grape growers in Minia region and other regions of Egypt. It could be achieved through conducting new horticultural practices depend on using new stimulants that safe for environment such as antioxidants (ascorbic, citric and salicylic acids as well as vitamin B complex and nutrients namely magnesium and boron. Nutrients especially Mg and B complex play a key role in the nutrition of grapevines. Both have many important functions especially in the synthesis and translocation of proteins, carbohydrates and plant pigments (Adriano, ١٩٨٥ and Nijjar, ١٩٨٥).

Antioxidants have many functions in plants. They are responsible for enhancing photosynthesis, plant pigments, amino acids and provide good control for diseases and pests. They increase the tolerance of plants to different stresses (Oretli, ١٩٨٧). The use of antioxidants was effective in improving yield and quality of grapes in various grapevine cvs. (Amin, ٢٠٠٧; Ahmed and Seleem- Basma, ٢٠٠٨; El- Sawy, ٢٠٠٩; Abd El- Kariem, ٢٠٠٩ and Abada and Abd El-Hameed, ٢٠٠٩ and ٢٠١٠). Also, the beneficed affect of magnesium and boron was reported by Ahmed and Abd El- Hameed (٢٠٠٣); Amin (٢٠٠٧); Farahat (٢٠٠٨); Abd El- Gaber- Nermean (٢٠٠٩) and Abd El- Wahab (٢٠١٠).

The present study was designed to throw some lights on the effect of single or combined applications of four antioxidants namely citric, ascorbic and salicylic acids and vitamin B complex (B_1 + B_2 + B_6 + B_{12}) as well as magnesium and boron on some vegetative growth characters, vine nutritional status, yield and quality of Thompson seedless grapes.

MATERIALS AND METHODS

This study was carried out during ٢٠١٠ and ٢٠١١ seasons on ninety- three uniform in vigour ١٦-years old head trained Thompson seedless grapevines grown in a private vineyard located at El-Faroukia village, Samalout district, Minia Governorate. The texture of the vineyard soil is silty clay and well drained and with a water table

depth not less than two meters deep (Table ١). Winter pruning during each season was conducted on the first week of Jan. by using head pruning system leaving ٧٢ eyes (١٠ long fruiting spurs × six eyes plus six replacement spurs × two eyes). All the selected vines had the same vine load (٧٢ eyes) and planted at ٢.٠ × ٢.٠ m apart. Surface irrigation system was followed.

Mechanical, physical and chemical analysis of the tested soil were carried out at the start of the experiment according to the procedures of Black *et al.* (١٩٦٥).

Table ١: Analysis of the vine yard:

Constituents	values
Particle size distribution:	
Sand %	**: ٢٥.٠٠**
Silt %	**: ٤٠.٩٠**
Clay %	**: ٣٤.١٠**
Texture%	**: Silty clay**
pH (١:٢.٥ extract)	**: ٧.٩**
O.M. %	**: ١.٦٠**
$CaCO_3$ %	**: ٢.٨٠**
Total N %	**: ٠.٠٩**
Available P (Olsen method) ppm	**: ١٥.٠**
Available K (ammonium acetate) ppm	**: ٦١١.٠**
EDTA extractable micronutrients (ppm):-	
Fe	**: ٤.١٠**
Mn	**: ٦.٦٠**
Zn	**: ٢.٩٩**
Cu	**: ١.٠٠**

All selected vines received the usual horticultural practices that are usually applied in the vineyard except those dealing with the application of antioxidants and the nutrient magnesium and boron fertilizers.

The experiment involved thirty- one treatments from single and combined applications the four antioxidants and magnesium sulphate and boric acid fertilizers:-

١- Control (water sprayed vines)
٢- Spraying citric acid (soluble in water) at ٥٠٠ ppm.
٣- Spraying salicylic acid (soluble in Ethyl alcohol) at ٥٠ ppm.
٤- Spraying ascorbic acid (soluble in water) at ٥٠٠ ppm.
٥- Spraying vitamin B complex (B_1 + B_2 + B_6 + B_{12}, soluble in water) at ٢٥ ppm.
٦- Spraying magnesium sulphate at ٠.٢٥ %.
٧- Spraying boric acid at ٠.٠٢٥ %.
٨- Spaying citric acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm.
٩- Spraying citric acid + ascorbic acid each at ٥٠٠ ppm.
١٠- Spraying citric acid at ٥٠٠ ppm + vitamin B complex at ٢٥ ppm.
١١- Spraying salicylic acid at ٥٠ ppm + ascorbic acid at ٥٠٠ ppm.
١٢- Spraying salicylic acid at ٥٠ ppm + vitamin B complex at ٢٥ ppm.
١٣- Spraying ascorbic acid at ٥٠٠ ppm + vitamin B complex at ٢٥ ppm.
١٤- Spraying citric acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm + ascorbic acid at ٥٠٠ ppm.
١٥- Spraying ascorbic acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm + B vitamins at ٢٥ ppm.
١٦- Spraying ascorbic acid at ٥٠٠ ppm + citric acid at ٥٠٠ ppm+ B vitamins at ٢٥ ppm.
١٧- Spraying ascorbic acid at ٥٠٠ ppm + citric acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm + vitamin B complex at ٢٥ ppm.
١٨- Spraying citric acid at ٥٠٠ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.
١٩- Spraying salicylic acid at ٥٠ ppm + Mg at ٠.٢٥ % + B at ٠.٠٢٥ %.
٢٠- Spraying ascorbic acid at ٥٠٠ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.
٢١- Spraying B vitamins at ٥٠ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.
٢٢- Spraying citric acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.

٢٣- Spraying citric acid at ٥٠٠ ppm + ascorbic acid at ٥٠٠ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.
٢٤- Spraying citric acid at ٥٠٠ ppm + B vitamins at ٢٥ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.
٢٥- Spraying salicylic acid at ٥٠ ppm + ascorbic acid at ٥٠٠ ppm + Mg at ٠.٢٥ %+ B at ٠.٠٢٥ %.
٢٦- Spraying salicylic acid at ٥٠ ppm + B vitamins at ٢٥ ppm + Mg at ٠.٢٥ % ٠+ B at ٠.٠٢٥ %.
٢٧- Spraying ascorbic acid at ٥٠٠ ppm + B vitamins at ٢٥ ppm + Mg at ٠.٢٥ % ٠+ B at ٠.٠٢٥ %.
٢٨- Spraying citric acid at ٥٠٠ ppm+ salicylic acid at ٥٠ ppm + ascorbic acid at ٥٠٠ ppm + Mg at ٠.٢٥ % ٠+ B at ٠.٠٢٥ %.
٢٩- Spraying ascorbic acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm + B vitamins at ٢٥ ppm + Mg at ٠.٢٥ % ٠ + B at ٠.٠٢٥ %.
٣٠- Spraying ascorbic acid at ٥٠٠ ppm + citric acid at ٥٠٠ ppm + B vitamins at ٢٥ ppm + Mg at ٠.٢٥ % ٠ + B at ٠.٠٢٥ %.
٣١- Spraying ascorbic acid at ٥٠٠ ppm + citric acid at ٥٠٠ ppm + salicylic acid at ٥٠ ppm + B vitamins at ٢٥ ppm. + Mg at ٠.٢٥ % ٠ + B at ٠.٠٢٥ %.

Each treatment was replicated three times, one vine per each. All antioxidants and magnesium sulphate (٩.٦ % Mg) and boric acid (١٧ % B) were sprayed three times during each season (the second week of Mar.) at growth start, just before bloom (the first week of April) and just after berry setting (fourth week of April). Triton B as a wetting agent was added at ٠.٠٥٪ to all the investigated solutions including the control. Spraying was made till runoff the vines were covered completely with solutions (٢ liters/ vine).

Complete randomized block design was followed for carrying out the statistical analysis.

Harvesting took place when T.S.S./acid ratio in the berries of the check treatment reached at least ٢٥:١ (at the middle of July in both seasons) (according to Weaver, ١٩٧٦). The yield of each vine was recorded in terms of weight (in kg.) and the average weight of cluster was recorded (g.)

Berries quality:

Five clusters from each vine were taken at random for the determination of physical and chemical characteristics:-

١- Average berry weight (g.).
٢- Average berry dimensions (longitudinal and equatorial, in cm).
٣- Percentage of total soluble solids in the juice by using Handy refractometer, in Brix.
٤- Percentage of total sugars in the juice by Lane and Eynon volumetric method as described in A.O.A.C. (١٩٩٥).
٥- Percentage of total acidity (as g tartaric acid/ ١٠٠ ml juice) by titration against ٠.١ N Na OH using phenolphthalein as an indicator (A.O.A.C., ١٩٩٥).
٦- The ratio between total soluble solids and acid.
٧- All the obtained data were tabulated and statistically analyzed using New L.S.D at ٥٪ for made all comparisons among the investigated treatment means according to Mead et al., (١٩٩٣).

RESULTS AND DISCUSSION

Yield and cluster weight:

It is clear from the data in Table ٢ that single or combined applications of antioxidants namely B vitamins ($B_١ + B_٢ + B_٦ + B_{١٢}$) at ٢٥ ppm, ascorbic acid at ٥٠٠ ppm, salicylic acid at ٥٠ ppm and citric acid at ٥٠٠ ppm as well as boron and magnesium fertilizers at ٠.٠٢٥ % and ٠.٢٥ %, respectively significantly improved yield and cluster weight comparing with the control treatment. The highest values were recorded on vines treated with magnesium sulphate, boric acid, citric acid, salicylic acid, ascorbic acid and B- vitamins, in descending order. Application of boron and magnesium were superior than the application of antioxidant singly in improving yield and cluster weight. A margin effect on yield and cluster weight was observed when vines were treated with both antioxidant and nutrient together comparing with using antioxidants alone.

Effect of antioxidant and nutrient treatments on thompson seedless grapevines

Table ٢: Effect of some antioxidants as well as magnesium and boron on the yield / vine (kg.) and cluster weight (g.) of Thompson seedless grapevines during ٢٠١٠ and ٢٠١١ seasons.

Treatments	Yield / vine (kg.)		Cluster weight (g.)	
	٢٠١٠	٢٠١١	٢٠١٠	٢٠١١
Control.	٤.٩	٥.١	٢٧١.٠	٣٠٠.٠
Citric acid (CA) at ٥٠٠ ppm.	٥.٨	٦.٥	٣٢٠.٠	٣٢٤.٠
Salicylic acid (SA) at ٥٠ ppm.	٥.٦	٦.٣	٣٠٩.٠	٣١٤.٠
Ascorbic acid (AA) at ٥٠٠ ppm.	٥.٣	٦.٠	٢٩٧.٠	٣٠٠.٠
B vitamins (BV) at ٢٥ ppm.	٥.١	٥.٥	٢٨٥.٠	٢٩١.٠
$MgSO_4$ at ٠.٢٥ %.	٦.٢	٧.٣	٣٤٣.٠	٣٤٨.٠
Boric acid at ٠.٠٢٥ %.	٦.٠	٦.٧	٣٣١.٠	٣٣٦.٠
CA + SA	٧.٣	٩.٣	٣٨٦.٠	٣٨٩.٠
CA+ AA	٧.٢	٨.٤	٣٧٩.٠	٣٨٤.٠
CA + BV	٧.٠	٨.٢	٣٦٦.٠	٣٧١.٠
SA + AA	٧.٠	٨.٢	٣٧١.٠	٣٧٤.٠
SA+ BA	٧.٠	٨.١	٣٦٦.٠	٣٧٠.٠
AA + BV	٦.٧	٧.٩	٣٥٥.٠	٣٦٠.٠
CA + SA + AA	٧.٤	٩.٩	٣٩٠.٠	٣٩٤.٠
AA + SA + BV	٧.٢	٩.٢	٣٨٠.٠	٣٨٤.٠
AA + CA + BV	٧.٣	٩.٧	٣٨٥.٠	٣٨٩.٠
CA + SA + AA + BV	٧.٤	٩.٩	٣٩٢.٠	٣٩٥.٠
CA + Mg + B	٦.٣	٧.٤	٣٣٣.٠	٣٣٧.٠
SA + Mg + B	٦.١	٧.٢	٣٢٠.٠	٣٢٥.٠
AA + Mg + B	٥.٩	٦.٩	٣٠٨.٠	٣١٢.٠
BV + Mg + B	٥.٦	٦.٩	٢٩٧.٠	٣٠٠.٠
CA + SA + Mg + B	٧.٤	١٠.٣	٣٩٢.٠	٣٩٨.٠
CA + AA + Mg + B	٧.٤	٩.٥	٣٩١.٠	٣٩٥.٠
CA + BV + Mg + B	٧.٢	٩.٢	٣٧٧.٠	٣٨٢.٠
SA + AA + Mg + B	٧.٣	٩.٢	٣٨٢.٠	٣٨٥.٠
SA + BV + Mg + B	٧.٢	٩.٣	٣٧٧.٠	٣٨٦.٠
AA + BV + Mg + B	٧.٠	٨.٩	٣٦٧.٠	٣٧٠.٠
CA + SA + AA + Mg + B	٧.٦	١٠.٨	٤٠٠.٠	٤٠١.٠
AA + SA + BV + Mg + B	٧.٤	١٠.٣	٣٩١.٠	٣٩٦.٠
AA + CA + BV + Mg + B	٧.٥	١٠.٨	٣٩٦.٠	٣٩٩.٠
All antioxidant + Mg + B	٨.٠	١١.٢	٤٠١.٠	٤٠٠.٠
New L.S.D at ٥.٠ %	٠.٣	٠.٣	١١.٠	١١.٩

The best results were obtained on vines received all antioxidants beside boron and magnesium fertilizers together. Untreated vines had the lowest values. These results were true during the two experimental seasons.

The promoting effect of antioxidants and the two nutrients on yield and cluster weight could be attributed to their positive action on amending the vines with their requirements from different macro and micronutrients, amino acids, vitamins and hormones, there by enhanced vine nutritional status in favour of producing more clusters on each vine.

These results regarding the effect of antioxidants are in agreement with those obtained by Abd El- Kariem (٢٠٠٩) on Crimson, Abada and Abd El- Hameed (٢٠٠٩) on Thompson seedless grapevines and Abada and Abd El- Hameed (٢٠١٠) on Flame seedless grapevines. El- Sawy (٢٠٠٩) who worked on Superior grapevines reported the beneficial effects of B and Mg on yield and cluster weight.

Physical and chemical characteristics of the berries:

Data in Tables ٣, ٤ and ٥ clearly demonstrate that quality of the berries were significantly affected by varying antioxidant and fertilization treatments. Single or combined applications of the four antioxidants as well as the two nutrients improved physical and chemical characteristics of the berries in terms of increasing berry weight and dimensions (longitudinal and equatorial), total soluble solids % and T.S.S/ acid and decreasing total acidity, compared with the control (non- application). The best antioxidant in this connection was citric acid. Application of magnesium and boron was effective in enhancing quality of the berries compared with using antioxidants when each was applied alone. Application of magnesium and boron in combination with antioxidants was more effective in enhancing fruit quality than using antioxidants alone. Treating Thompson seedless grapevines three times with a mixture of the four antioxidants (B-vitamins, ascorbic acid, salicylic acid and citric acid) plus boric acid

and magnesium sulphate gave the best results with regard to quality of the berries. Similar trend was observed during both seasons.

Table ٣: Effect of some antioxidants as well as magnesium and boron on the berry weight (g.) and longitudinal (cm.) of Thompson seedless grapevines during ٢٠١٠ and ٢٠١١ seasons.

Treatments	Berry weight (g.)		Berry longitudinal (cm.)	
	٢٠١٠	٢٠١١	٢٠١٠	٢٠١١
Control.	١.٤٥	١.٤٨	١.٥٥	١.٦٠
Citric acid (CA) at ٥٠٠ ppm.	١.٦٤	١.٦٦	١.٧٢	١.٧٥
Salicylic acid (SA) at ٥٠ ppm.	١.٦٠	١.٦٢	١.٦٨	١.٧١
Ascorbic acid (AA) at ٥٠٠ ppm.	١.٥٥	١.٥٨	١.٦٤	١.٦٧
B vitamins (BV) at ٢٥ ppm.	١.٤٩	١.٥٣	١.٦٠	١.٦٣
$MgSO_4$ at ٠.٢٥ %.	١.٧١	١.٧٣	١.٨٠	١.٨٢
Boric acid at ٠.٠٢٥ %.	١.٦٧	١.٦٩	١.٧٦	١.٧٨
CA + SA	١.٩٢	١.٩٥	١.٩٨	١.٩٩
CA+ AA	١.٨٨	١.٩٠	١.٩٤	١.٩٦
CA + BV	١.٨٢	١.٨٤	١.٨٨	١.٨٩
SA + AA	١.٨٥	١.٨٨	١.٩٢	١.٩٤
SA+ BA	١.٧٨	١.٨٠	١.٨٤	١.٨٥
AA + BV	١.٧٥	١.٧٧	١.٨٠	١.٨٢
CA + SA + AA	١.٩٨	٢.٠٨	٢.٠٥	٢.١٠
AA + SA + BV	١.٩٢	١.٩٩	١.٩٩	٢.٠٢
AA + CA + BV	١.٩٥	٢.٠٤	٢.٠٢	٢.٠٦
CA + SA + AA + BV	٢.٠٢	٢.١٢	٢.٠٨	٢.١٢
CA + Mg + B	١.٦٧	١.٧٠	١.٧٦	١.٧٩
SA + Mg + B	١.٦٣	١.٦٦	١.٧٢	١.٧٥
AA + Mg + B	١.٥٩	١.٦٣	١.٦٨	١.٧١
BV + Mg + B	١.٥٣	١.٥٧	١.٦٥	١.٦٧
CA + SA + Mg + B	١.٩٦	١.٩٩	٢.٠٢	٢.٠٢
CA + AA + Mg + B	١.٩٢	١.٩٤	١.٩٨	٢.٠٠
CA + BV + Mg + B	١.٨٦	١.٨٧	١.٩٢	١.٩٣
SA + AA + Mg + B	١.٨٩	١.٩٢	١.٩٧	١.٩٧
SA + BV + Mg + B	١.٨٢	١.٨٤	١.٨٨	١.٨٨
AA + BV + Mg + B	١.٧٩	١.٨٢	١.٨٣	١.٨٦
CA + SA + AA + Mg + B	٢.٠٣	٢.١٣	٢.٠٩	٢.١٥
AA + SA + BV + Mg + B	١.٩٦	٢.٠٢	٢.٠٣	٢.٠٨
AA + CA + BV + Mg + B	٢.٠٢	٢.٠٧	٢.٠٦	٢.١١
All antioxidant + Mg + B	٢.١١	٢.١٨	٢.١٩	٢.١٨
New L.S.D at ٥.٠ %	٠.٠٤	٠.٠٤	٠.٠٣	٠.٠٣

Table ٤: Effect of some antioxidants as well as magnesium and boron on the berry equatorial (cm.) and percentage of total soluble solids in the berries of Thompson seedless grapevines during ٢٠١٠ and ٢٠١١ seasons.

Treatments	Berry equatorial (cm.)		T.S.S %	
	٢٠١٠	٢٠١١	٢٠١٠	٢٠١١
Control.	١.٣٢	١.٣٦	١٧.٨	١٨.٠
Citric acid (CA) at ٥٠٠ ppm.	١.٤٦	١.٥٠	١٨.٦	١٨.٩
Salicylic acid (SA) at ٥٠ ppm.	١.٤٣	١.٤٦	١٨.٤	١٨.٨
Ascorbic acid (AA) at ٥٠٠ ppm.	١.٣٩	١.٤٢	١٨.٢	١٨.٦
B vitamins (BV) at ٢٥ ppm.	١.٣٥	١.٣٩	١٨.١	١٨.٣
$MgSO_4$ at ٠.٢٥ %.	١.٥٣	١.٥٩	١٩.٠	١٩.٢
Boric acid at ٠.٠٢٥ %.	١.٤٩	١.٥٥	١٨.٨	١٩.٠
CA + SA	١.٦٩	١.٧٢	١٩.٨	٢٠.٦
CA+ AA	١.٦٧	١.٧٥	١٩.٦	٢٠.٤
CA + BV	١.٦٢	١.٦٨	١٩.٤	١٩.٩
SA + AA	١.٦٥	١.٧٠	١٩.٥	٢٠.٢
SA+ BA	١.٥٩	١.٦٥	١٩.٢	١٩.٧
AA + BV	١.٥٦	١.٦٢	١٩.١	١٩.٤
CA + SA + AA	١.٧٦	١.٨٢	٢٠.٥	٢١.٢
AA + SA + BV	١.٧٢	١.٧٨	٢٠.٠	٢٠.٨
AA + CA + BV	١.٧٣	١.٨٠	٢٠.٢	٢١.٠
CA + SA + AA + BV	١.٧٩	١.٨٤	٢٠.٧	٢١.٥
CA + Mg + B	١.٤٩	١.٥٥	١٨.٩	١٩.٣
SA + Mg + B	١.٤٦	١.٤٨	١٨.٧	١٩.٢
AA + Mg + B	١.٤٢	١.٤٦	١٨.٥	١٨.٩
BV + Mg + B	١.٣٨	١.٤٢	١٨.٤	١٨.٦
CA + SA + Mg + B	١.٧٢	١.٧٦	٢٠.٢	٢١.٠
CA + AA + Mg + B	١.٧٠	١.٧٩	١٩.٩	٢٠.٧
CA + BV + Mg + B	١.٦٦	١.٧٢	١٩.٧	٢٠.٢
SA + AA + Mg + B	١.٦٨	١.٧٤	١٩.٨	٢٠.٥
SA + BV + Mg + B	١.٦٣	١.٦٨	١٩.٦	٢٠.٠
AA + BV + Mg + B	١.٥٩	١.٦٦	١٩.٥	١٩.٧
CA + SA + AA + Mg + B	١.٨٠	١.٨٦	٢٠.٨	٢١.٥
AA + SA + BV + Mg + B	١.٧٦	١.٨١	٢٠.٣	٢١.٢
AA + CA + BV + Mg + B	١.٧٧	١.٨٤	٢٠.٥	٢١.٣
All antioxidant + Mg + B	١.٨٩	١.٩٠	٢١.٢	٢١.٩
New L.S.D at ٥.٠ %	٠.٠٣	٠.٠٣	٠.٢	٠.٢

Table ٥: Effect of some antioxidants as well as magnesium and boron on percentage of total acidity and the ratio between T.S.S and acid in the berries of Thompson seedless grapevines during ٢٠١٠ and ٢٠١١ seasons.

Treatments	Total acidity %		T.S.S/ acid	
	٢٠١٠	٢٠١١	٢٠١٠	٢٠١١
Control.	٠.٧١٠	٠.٧١١	٢٥.١	٢٥.٣
Citric acid (CA) at ٥٠٠ ppm.	٠.٦٧٥	٠.٦٦٣	٢٧.٦	٢٨.٥
Salicylic acid (SA) at ٥٠ ppm.	٠.٦٧٧	٠.٦٧٤	٢٧.٢	٢٧.٩
Ascorbic acid (AA) at ٥٠٠ ppm.	٠.٦٨٩	٠.٦٨٦	٢٦.٤	٢٧.١
B vitamins (BV) at ٢٥ ppm.	٠.٦٩٩	٠.٦٩٨	٢٥.٩	٢٦.٢
$MgSO_4$ at ٠.٢٥ %.	٠.٦٥٢	٠.٦٤١	٢٩.١	٣٠.٠
Boric acid at ٠.٠٢٥ %.	٠.٦٦٤	٠.٦٥١	٢٨.٣	٢٩.٢
CA + SA	٠.٥٨٧	٠.٥٧٠	٣٣.٧	٣٦.١
CA+ AA	٠.٥٩٧	٠.٥٨٤	٣٢.٨	٣٤.٩
CA + BV	٠.٦١٩	٠.٦٠٨	٣١.٣	٣٢.٧
SA + AA	٠.٦٠٧	٠.٥٩٥	٣٢.١	٣٣.٩
SA+ BA	٠.٦٣٠	٠.٦٢٠	٣٠.٥	٣١.٨
AA + BV	٠.٦٤٠	٠.٦٣١	٢٩.٨	٣٠.٧
CA + SA + AA	٠.٥٥١	٠.٥٤١	٣٧.٢	٣٩.٢
AA + SA + BV	٠.٥٧٤	٠.٥٧٢	٣٤.٨	٣٦.٤
AA + CA + BV	٠.٥٦٣	٠.٥٦٠	٣٥.٩	٣٧.٥
CA + SA + AA + BV	٠.٥٤١	٠.٥٣٠	٣٨.٣	٤٠.٦
CA + Mg + B	٠.٦٦٤	٠.٦٥٢	٢٨.٥	٢٩.٦
SA + Mg + B	٠.٦٦٦	٠.٦٦٣	٢٨.١	٢٩.٠
AA + Mg + B	٠.٦٧٧	٠.٦٧٥	٢٧.٣	٢٨.٠
BV + Mg + B	٠.٦٨٩	٠.٦٨٧	٢٦.٧	٢٧.١
CA + SA + Mg + B	٠.٥٧٦	٠.٥٦٠	٣٥.١	٣٧.٥
CA + AA + Mg + B	٠.٥٨٧	٠.٥٧٣	٣٣.٩	٣٦.١
CA + BV + Mg + B	٠.٦٠٧	٠.٥٩٠	٣٢.٥	٣٤.٢
SA + AA + Mg + B	٠.٥٩١	٠.٥٨٤	٣٣.٥	٣٥.١
SA + BV + Mg + B	٠.٦٢٠	٠.٦٠٧	٣١.٦	٣٢.٩
AA + BV + Mg + B	٠.٦٢٩	٠.٦٢٠	٣١.٠	٣١.٨
CA + SA + AA + Mg + B	٠.٥٤١	٠.٥٣٠	٣٨.٤	٤٠.٦
AA + SA + BV + Mg + B	٠.٥٦٣	٠.٥٦١	٣٦.١	٣٧.٨
AA + CA + BV + Mg + B	٠.٥٦٠	٠.٥٥٠	٣٦.٦	٣٨.٧
All antioxidant + Mg + B	٠.٥٣٠	٠.٥١٠	٤٠.٠	٤٢.٩
New L.S.D at ٥.٠ %	٠.٠١٠	٠.٠١١		

The essential role of the antioxidants and boron and magnesium fertilizers on enhancing and translocation of carbohydrates and plant pigments as well as the positive action on promoting cell division

could result in enhancing quality of the berries (Nijjar, ١٩٨٥ and Oertili, ١٩٨٧).

The promoting effect of antioxidants on quality was also reported by Farahat (٢٠٠٨) on Red Globe grapes and Abd El- Kariem (٢٠٠٩) on Crimson grapes. The results of Abd El- Gaber- Nermean (٢٠٠٩) on Red Roomy grapes and Abd El- Wahab (٢٠١٠) on Thompson seedless grapes confirmed the present results regarding the positive effect of boron and magnesium on quality of the berries.

As a conclusion, it is advised to use a mixture of antioxidants and nutrient containing citric acid at ٥٠٠ ppm, salicylic acid at ٥٠ ppm, ascorbic acid at ٥٠٠ ppm, B- vitamins at ٢٥ ppm, boric acid at ٠.٠٢٥ % and magnesium sulphate at ٠.٢٥ % three times (growth start, just before bloom and just after berry setting) for improving yield quantitively and qualitatively of Thompson seedless grapevines.

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"إنتاجية كرمات العنب الطومسون سيدلس وتأثرها باستخدام بعض معاملات مضادات الأكسدة والمغذيات"

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خلال موسمي ٢٠١٠ ، ٢٠١١ تم رش كرمات العنب الطومسون سيدلس ثلاثة مرات بأربعة مواد مضادة للأكسدة (فيتامينات ب بتركيز ٢٥ جزء في المليون، حامض الأسكوربيك بتركيز ٥٠٠ جزء في المليون، حامض السلسليك بتركيز ٥٠ جزء في المليون، حامض الستريك بتركيز ٥٠٠ جزء في المليون) بالإضافة إلي حامض البوريك بتركيز ٠.٠٢٥ % وكبريتات الماغنيسيوم بتركيز ٠.٢٥ % ولقد تم استخدام هذه المواد بصورة فردية أو مشتركة بجميع التوليفات الممكنة.

كان هناك تحسن ملحوظ في كمية المحصول والخصائص الطبيعية والكيميائية للحبات بالاستخدام الفردي و المشترك لمضادات الأكسدة الأربعة والعنصرين من المواد المغذية وذلك بالمقارنة بمعاملة الكونترول وكان التحسن مرتبطا باستخدام فيتامينات ب (ب١، ب٢، ب٦، ب١٢) بتركيز ٢٥ جزء في المليون، حامض الأسكوربيك بتركيز ٥٠٠ جزء في المليون، حامض السلسليك بتركيز ٥٠ جزء في المليون، حامض الستريك بتركيز ٥٠٠ جزء في المليون، حامض البوريك بتركيز ٠.٠٢٥ % وكبريتات الماغنيسيوم بتركيز ٠.٢٥ % مرتبة ترتيبا تصاعديا.

أمكن الحصول علي أفضل النتائج بخصوص كمية المحصول وخصائص الجودة للحبات عند رش كرمات العنب الطومسون سيدلس النامية تحت ظروف منطقة المنيا ثلاثة مرات بمخلوط من أربعة مواد مضادة للأكسدة (حامض الستريك بتركيز ٥٠٠ جزء في المليون، حامض السلسليك بتركيز ٥٠ جزء في المليون، حامض الأسكوربيك بتركيز ٥٠٠ جزء في المليون، فيتامينات ب بتركيز ٢٥ جزء في المليون) بالاضافة الي العنصرين من المواد المغذية وهما حامض البوريك بتركيز ٠.٠٢٥ % وكبريتات الماغنيسيوم بتركيز ٠.٢٥ %.