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EFFECT OF ENRICHING BORON AND MAGNESIUM WITH VITAMINS ON NUTRITIONAL STATUS AND PRODUCTIVITY OF RUBY SEEDLESS GRAPEVINES

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ABSTRACT

The positive effects of enriched boron and magnesium with B- vitamins on vine nutritional status, yield and quality of Ruby seedless grapes were studied during ٢٠٠٩, ٢٠١٠ and ٢٠١١ seasons.

Application of B, Mg and B- vitamins either singly or in combinations had an announced promotion on growth characters, vine nutritional status, yield, berry coloration and quality of the berries rather than non- application. A great decline on shot berries was noticed due to using these treatments. A supreme effect was detected when B- vitamins were accompanied with B and Mg. The best results with regard to yield and fruit quality of Ruby seedless grapevines were obtained with spraying B, Mg and B-vitamins together.

INTRODUCTION

Ruby seedless grapevine cv. as a late in maturity cv. is considered one of the popular seedless grape cv. grown successfully under Minia region. The vines bear an acceptable yield at the expense of fruit quality in addition to the occurrence of higher percentage of shot berries and the higher berry set percentage accompanied with producing small berries. All of them are considered serious problems

facing the consumption and marketing of such grape cv. Application of vitamins along with boron and magnesium considered new approaches for amending the vines with their requirements from organic and inorganic nutrients at balanced rate.

Recently, it was suggested that all vitamins participate in plant growth and development. Most studies have indicated that various physiological processes such as nutrient uptake, photosynthesis, plant pigments and protein synthesis depend more or less on the availability of vitamins (Robinson, ١٩٧٣ and Bertschinger and Stadler, ١٩٩٧). Vitamins with their antioxidative properties play an important role in plant defence against oxidative stress induced by pesticides. The beneficial effects of vitamins were attributed to their positive action on enhancing cell division and various growth factors such as cytokinins and GA_3 (Oretili, ١٩٨٧ and Samiullah *et al*., ١٩٨٨).

For more than two decades, study of the role of the vitamins in plants has attracted sporadic attention.

Application of boron was found by many authors to enhance cell division, biosynthesis and translocation of carbohydrates, metabolism of most minerals and pollen germination (Miller *et al*., ١٩٩٠). Many workers attributed the positive action of Mg on fruiting of fruit crops to its essential effect on the biosynthesis of plant pigments and carbohydrates as well as cell division and the formation of seeds (Cook, ١٩٦٦).

Previous studies revealed by Abd El- Aziz (٢٠٠١); Ahmed and Abd El- Hameed (٢٠٠٣); Ahmed *et al*., (٢٠٠٧); Amin (٢٠٠٧); Abd El-Wahab (٢٠١٠) and Ibrahiem- Asmaa (٢٠١١) supported the beneficial effects of using boron on growth and fruiting of fruit crops. The same trend was observed by Abd El- Aziz (٢٠٠١); Abd El- Gaber- Nermean (٢٠٠٩); Abd El- Wahab (٢٠١٠) and Ahmed *et al*., (٢٠١١) who worked on the effect of Mg on fruit crops.

Application of vitamins was found by Numair- Safaa (٢٠٠١); Ibrahiem- Asmaa (٢٠٠٦); Ahmed and Seleem- Basma (٢٠٠٨); Allam (٢٠٠٨); Farahat (٢٠٠٨); Abada and Abd El- Hameed (٢٠٠٩); Abd El-Kariem (٢٠٠٩) and Uwakiem (٢٠١١) to enhance productivity of different fruit crops.

Effect of boron and magnesium with vitamins on ruby seedless grapevines

The main goals of this study were examining the effect of boron and magnesium especially when adjoined with vitamins B on fruiting of Ruby seedless grapevines.

MATERIALS AND METHODS

This study was carried out during the three successive seasons of ٢٠٠٩, ٢٠١٠ and ٢٠١١ on seventy- two ١٦- years old Ruby seedless grapevines grown in a private vineyard located at West Matay district, Minia Governorate. Vines were spaced at ١.٥ × ٣.٠ m and grown in sandy soil. Mechanical, physical and chemical analysis of the tested soil were carried out at three depths namely ٠.٠ – ٣٠ cm, ٣٠ – ٦٠ cm and ٦٠ – ٩٠ cm. Four samples of the soil were taken at these depths for analysis according to the procedures that outlined by Piper (١٩٥٠); Black (١٩٦٥) and Chapman and Pratt (١٩٦٥). Analysis of the tested soil is shown in Table (١).

Table ١: Analysis of the tested soil:

Characters	Values
Sand %	: ٨٠
Silt %	: ١٠.٠
Clay %	: ١٠.٠
Texture	Sandy
pH (١:٢.٥ extract)	: ٧.٥٥
E.C. (١:٢.٥ extract) mmhos/١cm/٢٥° C	: ١.٠١
O.M. %	: ٠.٢٢
$CaCO_3$ %	: ٤.١١
Total N %	: ٠.٠٢
Available P (ppm, Olsen method)	: ١.١
Available K (ppm, ammonium acetate)	: ٣٠.٠
Available Mg (ppm)	٢.٢

Shot pruning was adopted to give ١٥ fruiting spurs × three eyes plus six replacements spurs × two eyes (٥٧ eyes per vine). Quadrilateral cordons system was followed. Drip irrigation system was applied.

The present experiment consisted from the following eight treatments:-

١- Control (vines sprayed with water).
٢- Spraying boric acid at ٠.٠٥ %.
٣- Spraying magnesium sulphate at ٠.٥ %.
٤- Spraying B vitamins ($B_1 + B_2 + B_6 + B_{12}$) at ١٠٠ ppm.
٥- Spraying boric acid at ٠.٠٥ % + magnesium sulphate at ٠.٥ %.
٦- Spraying boric acid at ٠.٠٥ % + B vitamins.
٧- Spraying magnesium sulphate at ٠.٥ % + B vitamins.
٨- Spraying boric acid at ٠.٠٥ % + magnesium sulphate at ٠.٥ % + B vitamins at ١٠٠ ppm.

Each treatment was replicated three times, three vines per each. The selected vines received the common horticultural practices that already applied in the vineyard except those dealing with the present treatments (Mg, B and B vitamin). Magnesium sulphate (٩.٦ % Mg), boric acid (١٧ % B) and B vitamins ($B_1 + B_2 + B_6 + B_{12}$) were sprayed three times during each season at growth start (٢nd week of April), just after berry setting (٢nd week of June) and at one month later (٢nd week of July). The complete randomized block design was followed:

The following measurements were recorded during the three seasons.

١- Two growth traits namely main shoot length (cm) and leaf area (cm^2) were recorded at the last week of July. Leaf area (cm^2) was measured in the twenty leaves opposite to the basal clusters using Ahmed and Morsy (١٩٩٩) equation and then the average was calculated.
٢- For determining percentages of N, P, K and Mg, twenty leaves picked from those opposite to the basal clusters (Balo *et al.*, ١٩٨٨) for each vine were taken at the last week of July in the three seasons. Blades and petioles for leaves were separated when blades were discarded and petioles were saved for determining of N, P, K and Mg. Petioles were oven dried at ٧٠ ° C and grounded then ٠.٥ g weight of each samples was digested using H_2SO_4 and H_2O_2 until clear solution was obtained (according to Chapman and Pratt, ١٩٦٥). The digested solutions were quantitatively transferred to

١٠٠ ml volumetric flask and complete to ١٠٠ ml by distilled water. Therefore, leaf contents of N, P, K and Mg for each sample were determined as follows:-

١- Nitrogen % was determined by the modified microkejldahl method as described by Peach and Tracey (١٩٦٥).

٢- Phosphorus % was determined by using Olsen method as reported by Wilde *et al*., (١٩٨٥).

٣- Potassium % was Flame photometrically determined using the method outlined by Chapman and Pratt (١٩٦٥).

٤- Magnesium was determined by using versene method as reported by Black (١٩٦٥).

When T.S.S/ acid exceeded ٢٥: ١ (٣rd week of Sept.), the clusters were considered ready for harvest. Yield expressed in weight (kg.) and number of clusters per vine was recorded. Five clusters from each vine were taken for determination of the following physical and chemical characteristics:-

١- Cluster weight (g.).

٢- Percentage of shot berries by dividing the number of small berries by the total number of berries and multiplying the product by ١٠٠.

٣- Berry weight (g.).

٤- Percentage of total soluble solids.)

٥- Percentage of total acidity (as g tartaric acid/ ١٠٠ ml juice) (A.O.A.C., ١٩٩٥).

٦- T.S.S/ acid.

٧- Dynamics of wood ripening coefficient was determined by dividing the length of ripened part (brownish colour) by the total length of the shoots (according to Bouard, ١٩٦٦) in the ten shoots at the last week of Oct. in the three seasons.

Data recorded for the three seasons were subjected to analysis of variance according to Mead *et al*., (١٩٩٣) using new L.S.D at ٥ %.

RESULTS AND DISCUSSION

١- Main shoot length and leaf area:

It is clear from the obtained data in Table (٢) that single and combination applications of boron, Mg and B- vitamins significantly was accompanied with improving the main shoot length and leaf area comparing with the check treatment. Application of vitamins B, boron and magnesium, in ascending order significantly improved the main shoot length and leaf area. Combined applications of B, Mg and vitamins was superior than application of each alone. Enriched both Mg or B with B- vitamins was very essential for enhancing such two growth characters than using Mg and B alone.

Table ٢: Effect of some boron, magnesium and some vitamin treatments on the main shoot length (cm.), leaf area (cm^2) and percentages of N and P in the leaves of Ruby seedless grapevines during ٢٠٠٩, ٢٠١٠ and ٢٠١١ seasons.

Treatments	Main shoot length (cm.)			Leaf area (cm^2)		
	٢٠٠٩	٢٠١٠	٢٠١١	٢٠٠٩	٢٠١٠	٢٠١١
Control.	٩٩.١	١٠١.٠	١٠٢.٢	٧١.٠	٧١.٨	٧٢.٠
Boron.	١٠٤.٠	١٠٥.٠	١٠٦.٣	٧٣.٩	٧٤.٩	٧٥.١
Magnesium.	١٠٥.٩	١٠٦.٩	١٠٨.٢	٧٥.٩	٧٦.٨	٧٧.١
Vitamins B.	١٠٢.٢	١٠٢.٩	١٠٤.٣	٧٢.٤	٧٣.٣	٧٤.٠
B + Mg.	١٠٨.٠	١٠٩.٠	١١٠.٣	٧٧.٨	٧٨.٩	٧٩.٥
B + vitamins.	١٠٩.٦	١١١.٠	١١٢.٣	٧٩.١	٨٠.٣	٨٠.٦
Mg + vitamins.	١١٠.٦	١١٢.٥	١١٤.٠	٨٠.٣	٨١.٩	٨٣.٣
B + Mg + vitamins.	١١٣.٠	١١٥.١	١١٥.٩	٨٢.٤	٨٤.٠	٨٥.٧
New L.S.D at ٥ %	١.١	١.٢	١.١	١.٢	١.٠	١.٠
Character	N %			P %		
Control.	١.٦٤	١.٦٦	١.٧١	٠.١٦	٠.١٥	٠.١٧
Boron.	١.٧٨	١.٧٩	١.٨٥	٠.٢٤	٠.٢٥	٠.٢٣
Magnesium.	١.٨٦	١.٨٥	١.٩٠	٠.٢٨	٠.٣٠	٠.٢٦
Vitamins B.	١.٧١	١.٧١	١.٧٧	٠.٢٠	٠.٢٠	٠.٢٠
B + Mg.	١.٩٢	١.٩٠	١.٩٠	٠.٣٢	٠.٣٥	٠.٣١
B + vitamins.	١.٩٨	١.٩٧	١.٩٩	٠.٣٥	٠.٣٩	٠.٤٠
Mg + vitamins.	٢.٠٧	٢.٠٢	٢.٠٣	٠.٣٨	٠.٤٤	٠.٤٣
B + Mg + vitamins.	٢.١٣	٢.١٥	٢.١٨	٠.٤٢	٠.٤٩	٠.٥٠
New L.S.D at ٥ %	٠.٠٥	٠.٠٤	٠.٠٥	٠.٠٣	٠.٠٤	٠.٠٣

The maximum values were recorded on the vines that received three sprays of B, Mg and B vitamins together. Significant differences on such two growth characters were observed among treated and untreated vines. Untreated vines produced the minimum values. Similar results were announced during the three seasons.

The essential role of B, Mg and B vitamins on enhancing cell division and the biosynthesis of organic foods could result in enhancing growth characters (Oertili, ١٩٨٧ and Miller *et al*., ١٩٩٠).

These results are in harmony with those obtained by Abd El-Wahab (٢٠١٠) who worked on B; Ahmed *et al*., (٢٠١١) who worked on Mg and Uwakiem (٢٠١١) who worked on B vitamins.

٢- Prcentages of N, P, K and Mg:

Data in Table (٢) clearly show that the four major nutrients namely N, P, K and Mg in the leaves were significantly increased by using B, Mg and B- vitamins either singly or in all combinations rather than non- application. The promotion was associated with using B- vitamins, B and Mg, in ascending order. Combined applications of B, Mg and B- vitamins were superior than using each nutrient alone in improving these nutrients. Varying these treatments caused significant differences on these nutrients. Spraying the vines three times with B, Mg and B- vitamins together gave the maximum values. The minimum values were recorded on untreated vines. Similar results were detected during the three seasons.

The beneficial effect of B, Mg and B- vitamins on stimulating root development surely reflected in enhancing uptake of nutrients.

These results are in harmony with those obtained by Abd El-Wahab (٢٠١٠) who worked on B; Ahmed *et al*., (٢٠١١) who worked on Mg and Uwakiem (٢٠١١) who worked on B vitamins.

٣- Yield and cluster weight:

Data in Tables (٣& ٤) clearly show that single and combined applications of B, Mg and B- vitamins significantly was accompanied with improving yield expressed in weight and number of clusters as well as cluster weight comparing with the control treatment. Using B-vitamins, B and Mg, in ascending order was significantly very effective in promoting the yield and cluster weight. Number of

clusters did not alter significantly due to B, Mg and vitamins application in the first season of study.

Table ٣: Effect of some boron, magnesium and some vitamin treatments on the percentages of K and Mg, yield/ vine (kg.) and number of clusters per vine of Ruby seedless grapevines during ٢٠٠٩, ٢٠١٠ and ٢٠١١ seasons.

Treatments	K %			Mg %		
	٢٠٠٩	٢٠١٠	٢٠١١	٢٠٠٩	٢٠١٠	٢٠١١
Control.	١.٧١	١.٨٠	١.٧٩	٠.٢٢	٠.١٩	٠.٢٥
Boron.	١.٨٤	١.٩٣	١.٩١	٠.٢٩	٠.٣٠	٠.٣٣
Magnesium.	١.٩٢	٢.٠٠	١.٩٩	٠.٣٤	٠.٣٥	٠.٣٧
Vitamins B.	١.٧٧	١.٨٦	١.٨٦	٠.٢٥	٠.٢٦	٠.٢٩
B + Mg.	١.٩٩	٢.٠٨	٢.١٠	٠.٣٧	٠.٣٨	٠.٤٢
B + vitamins.	٢.٠٧	٢.١٦	٢.١٧	٠.٤٢	٠.٤٣	٠.٥٠
Mg + vitamins.	٢.١٥	٢.٢٢	٢.٢٤	٠.٤٧	٠.٤٨	٠.٥٥
B + Mg + vitamins.	٢.٢٢	٢.٣٠	٢.٣٢	٠.٥٥	٠.٥٦	٠.٥٩
New L.S.D at ٥ %	٠.٠٥	٠.٠٥	٠.٠٦	٠.٠٣	٠.٠٣	٠.٠٣
Character	Yield/ vine (kg.)			No. of clusters/ vine		
Control.	١٢.٠	١٣.٢	١٣.٣	٣٠.٠	٣٣.٠	٣٣.٠
Boron.	١٣.٢	١٦.٣	١٦.٨	٣١.٠	٣٨.٠	٣٩.٠
Magnesium.	١٣.٥	١٧.٦	١٨.١	٣١.٠	٤٠.٠	٤١.٠
Vitamins B.	١٢.٩	١٥.٠	١٤.٧	٣١.٠	٣٦.٠	٣٥.٠
B + Mg.	١٤.٣	١٨.٩	١٩.١	٣٢.٠	٤٢.٠	٤٢.٠
B + vitamins.	١٤.٧	٢٠.٣	٢٠.٥	٣٢.٠	٤٤.٠	٤٥.٠
Mg + vitamins.	١٥.١	٢١.٨	٢١.٩	٣٢.٠	٤٦.٠	٤٦.٠
B + Mg + vitamins.	١٥.٤	٢٣.٣	٢٣.٥	٣٢.٠	٤٨.٠	٤٦.٠
New L.S.D at ٥ %	٠.٩	١.٣	١.٢	N.S	١.٨	٢.٠

Combined application was favourable than single one in this respect. Yield ad cluster weight were significantly differed among treated and untreated vines. Treating the vines three times with a mixture of B, Mg and B- vitamins gave the best results with regard to yield. Under such promised treatment, yield reached ١٥.٤ and ٢٣.٢ kg per vine compared with ١٢.٠ and ١٣.٢ kg produced by control vines

during both seasons, respectively. Untreated vines produced the lowest yield. These results were true during the three seasons.

Table ٤: Effect of some boron, magnesium and some vitamin treatments on the cluster weight (g.), shot berries %, berry colouration % and berry weight (g.) of Ruby seedless grapevines during ٢٠٠٩, ٢٠١٠ and ٢٠١١ seasons.

Treatments	Cluster weight (g.)			Shot berries %		
	٢٠٠٩	٢٠١٠	٢٠١١	٢٠٠٩	٢٠١٠	٢٠١١
Control.	٤٠٠.٠	٤٠١.٠	٤٠٢.٠	١٥.٠	١٤.٨	١٤.٥
Boron.	٤٢٦.٠	٤٢٨.٠	٤٣٠.٠	١١.٠	١٠.٨	١٠.٤
Magnesium.	٤٣٧.٠	٤٤٠.٠	٤٤٢.٠	٩.٠	٨.٨	٨.٥
Vitamins B.	٤١٥.٠	٤١٧.٠	٤١٩.٠	١٣.٠	١٢.٨	١٢.٥
B + Mg.	٤٤٨.٠	٤٥٠.٠	٤٥٥.٠	٧.٠	٦.٨	٦.٥
B + vitamins.	٤٦٠.٠	٤٦٢.٠	٤٦٥.٠	٥.٠	٤.٧	٤.٥
Mg + vitamins.	٤٧١.٠	٤٧٤.٠	٤٧٥.٠	٤.٠	٣.٥	٣.٢
B + Mg + vitamins.	٤٨٢.٠	٤٨٦.٠	٤٩٠.٠	٣.٠	٢.٨	٢.٥
New L.S.D at ٥ %	١٠.٠	١١.٠	١١.٠	٠.٦	٠.٧	٠.٧
Character	**Berry colouration %**			**Berry weight (g.)**		
Control.	٦١.٠	٦٢.٠	٦٢.٠	٢.٣٠	٢.٤٠	٢.٤١
Boron.	٦٧.٠	٦٨.٣	٦٩.٠	٢.٤٧	٢.٤٥	٢.٤٤
Magnesium.	٦٩.٠	٧٠.٤	٧١.٠	٢.٥٣	٢.٥٠	٢.٤٩
Vitamins B.	٦٤.٠	٦٥.٣	٦٤.٠	٢.٤١	٢.٣٩	٢.٣٨
B + Mg.	٧١.٩	٧٣.٣	٧٤.٠	٢.٧١	٢.٦٩	٢.٦٧
B + vitamins.	٧٤.٠	٧٥.٣	٧٦.٠	٢.٨٠	٢.٧٨	٢.٧٧
Mg + vitamins.	٧٧.٠	٧٨.٤	٧٩.٠	٢.٨٦	٢.٨٥	٢.٨٥
B + Mg + vitamins.	٨٩.٩	٩١.٠	٩١.٥	٢.٩١	٢.٩٢	٢.٩٣
New L.S.D at ٥ %	١.٩	٢.٠	٢.٠	٠.٠٥	٠.٠٧	٠.٠٧

The promoting effect of these nutrients and B- vitamins on growth and vine nutritional status surely reflected on enhancing the yield.

These results are in agreement with those obtained by Amin (٢٠٠٧) on B; Ahmed *et al*., (٢٠١١) on Mg and Farahat (٢٠٠٨) on B vitamins.

٤- Percentage of shot berries:

It was significantly declined with single and combined applications of B, Mg and B- vitamins rather than non- application. Percentage of shot berries was varied significantly with varying B, Mg and B- vitamin treatments. The reduction on shot berries % was associated with using B- vitamins, B and Mg, in ascending order. The minimum values were recorded on vines sprayed with all nutrients together. The maximum values were recorded on untreated vines. Similar trend was noticed during the three seasons.

The beneficial of B, Mg and B- vitamins in enhancing fertilization and pollen germination as well as their positive action on supplying the vines with their requirements from inorganic and organic nutrients at balanced rate surely reflected on reducing shot berries %.

These results are in accordance with those obtained by Amin (٢٠٠٧) and Ahmed *et al*., (٢٠٠٧) on B; Abd El- Gaber- Nermean (٢٠٠٩) on Mg and Ibrahiem- Asmaa (٢٠٠٦) on B- vitamins.

٥- Percentage of berry colouration:

It is evident from the data in Table (٤) that supplying the vines with B, Mg and B- vitamins either singly or in combinations significantly enhanced berry colouration rather than non- application. The stimulation on colouration was attributed to using B- vitamins, B and Mg in ascending order. Great berry colouration was recorded on the vines that sprayed with B, Mg and B- vitamins together. Untreating the vines gave the lowest berry colouration. These results were true during the three seasons.

The beneficial effects of B, Mg and B- vitamins on the biosynthesis of sugars and plant pigments explain the present results.

٦- Physical and chemical characteristics of the berries:

It is clear from the data in Tables (٤& ٥) that single and combined applications of B, Mg and B- vitamins significantly was followed by enhancing berry weight, total soluble solids % and T.S.S/ acid and reducing total acidity % rather than non- application. Enriching B and/ or Mg with B- vitamins was superior than using each alone in enhancing quality of the berries.

Table ٥: Effect of some boron, magnesium and some vitamin treatments on some chemical characteristics in the berries of Ruby seedless grapevines during ٢٠٠٩, ٢٠١٠ and ٢٠١١ seasons.

Treatments	Total soluble solids %			Total acidity %		
	٢٠٠٩	٢٠١٠	٢٠١١	٢٠٠٩	٢٠١٠	٢٠١١
Control.	١٧.١	١٧.٥	١٧.٦	٠.٦٨٠	٠.٦٨٤	٠.٦٨٦
Boron.	١٧.٧	١٨.٠	١٨.٠	٠.٦٥٥	٠.٦٥٣	٠.٦٤٦
Magnesium.	١٨.١	١٨.٢	١٨.٣	٠.٦٤١	٠.٦٣٩	٠.٦٢٦
Vitamins B.	١٧.٤	١٧.٨	١٧.٨	٠.٦٦٧	٠.٦٦٥	٠.٦٥٨
B + Mg.	١٨.٣	١٨.٥	١٨.٦	٠.٦٢٩	٠.٦٢٧	٠.٦٢٠
B + vitamins.	١٨.٦	١٨.٨	١٨.٩	٠.٦١٧	٠.٦١٥	٠.٦٠٧
Mg + vitamins.	١٩.١	١٩.٠	١٩.٢	٠.٦٠٥	٠.٦٠٢	٠.٥٩٤
B + Mg + vitamins.	١٩.٤	١٩.٥	١٩.٦	٠.٥٩١	٠.٥٨٧	٠.٥٨١
New L.S.D at ٥ %	٠.٢	٠.٢	٠.٢	٠.٠١١	٠.٠١٢	٠.٠١١
Character	T.S.S/ acid			Wood ripening coefficient		
Control.	٢٥.١	٢٥.٦	٢٥.٧	٠.٨٠	٠.٧٩	٠.٨١
Boron.	٢٧.٠	٢٧.٦	٢٧.٩	٠.٨٨	٠.٨٤	٠.٨٧
Magnesium.	٢٨.٢	٢٨.٥	٢٩.٢	٠.٩١	٠.٨٧	٠.٩٠
Vitamins B.	٢٦.١	٢٦.٨	٢٧.١	٠.٨٤	٠.٨١	٠.٨٤
B + Mg.	٢٩.١	٢٩.٥	٣٠.٠	٠.٩٢	٠.٨٩	٠.٩٣
B + vitamins.	٣٠.١	٣٠.٦	٣١.١	٠.٩٥	٠.٩١	٠.٩٦
Mg + vitamins.	٣١.٦	٣١.٦	٣٢.٣	٠.٩٧	٠.٩٤	٠.٩٨
B + Mg + vitamins.	٣٢.٨	٣٣.٢	٣٣.٧	٠.٩٨	٠.٩٦	٠.٩٨
New L.S.D at ٥ %	٠.٨	٠.٩	١.٠	٠.٠٣	٠.٠٢	٠.٠٣

The promotion was depended on using B- vitamins, B and Mg, in ascending order. The best results with regard to quality of the berries were obtained due to spraying the vines three times with B, Mg and B-vitamins together. These results were true during the three seasons.

The beneficial effects of B, Mg and B- vitamins on the biosynthesis of sugars and plant pigments explain the present results.

These results are in accordance with those obtained by Amin (٢٠٠٧) and Ahmed *et al.*, (٢٠٠٧) on B; Abd El- Gaber- Nermean (٢٠٠٩) on Mg and Ibrahiem- Asmaa (٢٠٠٦) on B- vitamins.

٧- **Wood ripening coefficient:**

Table (٥) shows that single or combined application of B, Mg and B- vitamins significantly promoted wood ripening coefficient rather than non- application. The advancement in wood ripening coefficient was attributed to using B- vitamins, B and Mg in ascending order. Enriching B and Mg with B- vitamins effectively accelerated wood ripening. Wood ripening coefficient was maximized with spraying the vines three times with B, Mg and B- vitamins together. The lowest value was recorded on untreated vines. These results were true during the three seasons.

The beneficial effect of B, Mg and B- vitamins on the biosynthesis of organic and inorganic foods at higher levels could result in increasing wood ripening.

As a conclusion, treating Ruby seedless grapevines thrice with a mixture containing B, Mg and B- vitamins gave the best results with regard to yield and fruit quality. The essential of enriching nutrients with B- vitamins during nutrition of fruit crops was arised.

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تأثير تزويد البورون والماغنيسيوم بالفيتامينات علي الحالة الغذائية وإنتاجية كرمات العنب الروبي سيدلس

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تم دراسة التأثير الإيجابي لتزويد البورون والماغنسيوم بفيتامينات ب علي الحالة الغذائية للكرمات وكمية المحصول وخصائص الجودة للحبات في كرمات العنب الروبي سيدلس وذلك خلال مواسم ٢٠٠٩، ٢٠١٠، ٢٠١١.

أدي الاستخدام الفردي والمشترك للبورون والماغنسيوم وفيتامينات ب إلي تحسين صفات النمو والحالة الغذائية للكرمات وكمية المحصول ولون الحبات والجودة وذلك بالمقارنة بعدم الاستخدام وكان هناك نقص ملحوظ في النسبة المئوية للحبات الصغيرة عند استخدام هذه المعاملات.

وكان هناك تأثير كبير عند استخدام الفيتامينات جنبا الي جنب مع البورون والماغنسيوم.

أمكن الحصول علي أفضل النتائج بخصوص كمية محصول الكرمة وخصائص الجودة للحبات في كرمات العنب الروبي سيدلس عند رش البورون والماغنسيوم وفيتامينات ب معا.