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EFFECT OF SOME AMINO ACIDS ENRICHED WITH DIFFERENT NUTRIENTS ON FRUITING OF RED ROOMY GRAPEVINES

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ABSTRACT

Growth, nutritional status, yield, physical and chemical characters of Red Roomy grapes as affected by the application of five amino acids (methionene, tryptophane, cystene, cysteine and lysine) enriched with N, P and K twice, thrice or four times at 0.1, 0.05, 0.1 or 0.2 % were investigated during 2008, 2009 and 2010 seasons.

Results showed that increasing frequencies and concentrations of amino acids enriched with different nutrients was accompanied with a gradual stimulation on growth characters nutrients in the leaves, yield, physical and chemical characters of the berries. In most cases, increasing frequencies from thrice to four times and concentrations from 0.1 to 0.2 % had a slight promotion on all parameters.

The results suggest that treating Red Roomy grapevines three times with a mixture of amino acids containing methionene, tryptophane, cystene, cysteine and lysine as well as N, P and K at 0.1 % was essential for improving yield quantitatively and qualitatively.

INTRODUCTION

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Improving yield of Red Roomy grapevine quantitatively and qualitatively as well as checking cluster looseness and shot berries are considered the most important tasks for pomologists in Egypt.

The use of stimulants especially amino acids (Ahmed and Abd El- Hameed, ٢٠٠٣; Ahmed *et al.*, ٢٠٠٧, Amin, ٢٠٠٧; Seleem- Basma and Abd El- Hameed, ٢٠٠٨ and Sayed- Heba, ٢٠١٠) and nutrients (Sayed, ٢٠٠٢; Madian, ٢٠٠٤; Abd El- Hameed, ٢٠٠٥; Abd El- Gaber- Nermean, ٢٠٠٩ and Abd El- Wahab, ٢٠١٠) resulted in enhancing growth, vine nutritional status, yield as well as physical and chemical characters in different grapevine cvs.

This study aimed to examine the effect of some amino acids enriched with various nutrients at different frequencies and concentrations on growth, vine nutritional status, yield and quality of Red Roomy grapes.

MATERIALS AND METHODS

The present investigation was carried out during the three consecutive seasons of ٢٠٠٨, ٢٠٠٩ and ٢٠١٠ seasons on sixty head trained ١٥- years old Red Roomy grapevines. The uniform in vigour vines were grown in silty loam soil at ٢ × ٢ m apart in a private vineyard located at Samalout district, Minia Governorate. Vines were irrigated with surface irrigation system. Analysis of the soil given in Table ١ was made according to the procedures of Wilde *et al.*, (١٩٨٥)

Table ١: Analysis of the tested soil:

Characters	Values
Sand %	: ٧.٥
Silt %	: ٧٠.٥
Clay %	: ٢٢.٠
Texture	Silty loam
pH (١:٢.٥ suspension)	: ٨.٠
E.C. (١:٢.٥ extract) (mmhos/١ cm/٢٥C)	: ٠.٦٢
O.M. %	: ١.٨٣
CaCO _r %	: ١.٥٢
Total N %	: ٠.١٠
Available P (Olsen method, ppm)	: ٥.١٠
Available K (ammonium acetate, ppm)	: ٤٤٢.٥

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In each season, the selected vines were pruned at the second week of January using head pruning system by leaving 10 buds/ vine (12 fruiting spurs × 8 buds plus 6 replacement spurs × 2 buds).

The experiment included ten treatments of frequencies and concentrations of some amino acids (methionene, tryptophane, cystene, cysteine and lysine) enriched with N, P and K as follow:

- 1- Control (untreated vines).
- 2- Spraying amino acids enriched with nutrients (N, P and K) at 0.05 % twice (growth start and again at berry setting stage).
- 3- Spraying amino acids enriched with nutrients at 0.1 % twice (growth start and again at berry setting stage).
- 4- Spraying amino acids enriched with nutrients at 0.2 % twice (growth start and again at berry setting stage).
- 5- Spraying amino acids enriched with nutrients at 0.05 % thrice (at the same previous two dates and at one month later).
- 6- Spraying amino acids enriched with nutrients at 0.1 % thrice (at the same previous two dates and at one month later).
- 7- Spraying amino acids enriched with nutrients at 0.2 % thrice (at the same previous two dates and at one month later).
- 8- Spraying amino acids enriched with nutrients at 0.05 % four times (at the same previous three dates and at one month later).
- 9- Spraying amino acids enriched with nutrients at 0.1 % four times (at the same previous three dates and at one month later).
- 10- Spraying amino acids enriched with nutrients at 0.2 % four times (at the same previous three dates and at one month later).

Each treatment was replicated three times, two vines per each. Triton B was added to all solutions at 0.05% as wetting agent. Spraying was done till runoff (2 L/ vine). All chosen vines received the common and regular fertilization as well as horticultural practices expect foliar application of amino acids and N, P and K. The experiment was designed as complete randomized blocks.

Average shoot length (cm) was measured the second week of August. Average leaf area (cm²) was estimated by picking twenty mature leaves from each vine from those leaves apposite to the first

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clusters on the shoots on the second week of August. The average leaf area was calculated according to the equation reported by Ahmed and Morsy (1999).

$$\text{Leaf area (cm}^2\text{)} = 0.40 \cdot (0.79 \times \text{diameter}^2) + 10.23$$

Petioles of the leaves were saved, washed with distilled water then dried at 70 °C till constant weight. The dried samples were ground using an electric mill and digested using H₂SO₄ and H₂O₂. Percentages of N, P and K were determined in the digest using the standard methods outlined by Wilde *et al.*, (1980) and the results were calculated on dry weight basis.

Berry set percentages was calculated by dividing number of berries per cluster by total number of flowers per cluster and multiplying the product by 100. Three clusters per each replicate were used for measuring this parameter.

At harvesting date (last week of September) yield expressed in weight (kg), number of clusters per vine and cluster weight were recorded. Five clusters per vine were picked for the determination of quality parameters. Number of shot berries were counted for each cluster then divided by total number of berries/ cluster and the product was multiplied by 100 for calculating percentage of shot berries. Total soluble solids, total sugars and total acidity (as g tartaric acid/ 100 ml juice) were determined in the juice according to A.O.A.C. (1980).

All obtained data were tabulated and statistically analyzed according to Gomez and Gomez (1984) and the averages were compared using New L.S.D test at 5 %.

RESULTS AND DISCUSSION

Main shoot length, leaf area and percentages of N, P and K in the leaves:

It is clear from the obtained data (Table 2) that spraying amino acids (methionene, tryptophane, cystene, cysteine and lysine) enriched with N, P and K twice, thrice or four times at 0.10 to 0.2 % significantly stimulated main shoot length, leaf area and percentages of N, P and K in the leaves comparing with the control. The promotion

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effect was associated with increasing frequencies and concentrations. No significant differences on these parameters were observed among the two higher frequencies (thrice or four times) and concentrations (0.1 and 0.2 %). The maximum values were recorded on vines that received four sprays of amino acids enriched with N, P and K at 0.2 %. The lowest values were recorded on the untreated vines. Similar results were obtained during the three seasons.

The stimulating effect of amino acids and different nutrients on cell division and the biosynthesis of organic foods surely reflected on enhancing growth characters. The great benefits of these nutrients on root development could result in enhancing the uptake of nutrients.

The promoting effect of amino acids on growth and vine nutritional status was also reported by Ahmed *et al.*, (2007) and Sayed- Heba (2010).

The results regarding the promotive effect of nutrients on growth and vine nutritional status are in agreement with those obtained by Sayed (2002); Madian (2004) and Abd El- Wahab (2010).

Berry setting, number of clusters per vine, yield and cluster weight:

Data in Tables 3 and 4 clearly reveal that percentage of berry setting, number of clusters per vine, yield and cluster weight were significantly improved with using amino acids enriched with N, P and K twice, thrice or four times at 0.1 to 0.2 % comparing with the no application. A gradual promotion on these parameters was observed with the increase in frequencies and concentrations of amino acids enriched with nutrients. Increasing frequencies from thrice to four times and concentrations from 0.1 to 0.2 % had no significant promotion on these parameters. Treating the vines thrice with such bstimulant at 0.1 % gave an economical yield. Under such promised treatment, yield in the three seasons reached 8.8, 12.2 and 12.3 kg compared with 6.7, 7.3 and 7.3 kg produced by the untreated vines. The present treatments had no effect on the number of clusters per vine in the first seasons of study. These results were true during the three seasons.

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The promotive effect of amino acid enriched with N, P and K on growth and vine nutritional status surely reflected on enhancing berry setting and yield.

The results of Ahmed and Abd El- Hameed (٢٠٠٣), Amin (٢٠٠٧) and Sayed- Heba (٢٠١٠) confirmed the present results regarding the promotive effects of amino acids on the yield. The promotive effects of nutrients on yield was revealed by Sayed (٢٠٠٢); Abd El- Hameed (٢٠٠٥) and Abd El- Wahab (٢٠١٠).

Quality of berries:

Data obtained in Table ٣ reveal that foliar application of amino acids enriched with N, P and K twice, thrice or four times at ٠.٠٥ to ٠.٢ % significantly improved berries quality in terms of increasing berry weight, total soluble solids % and total sugars and reducing shot berries % and total acidity compared with the untreated control. The effect either of increase or decrease was associated with the increase in frequencies from twice to four times and concentrations from ٠.٠٥ to ٠.٢ %. Negligible promotion on quality parameters of berries was observed using amino acids enriched with nutrients thrice or four times as well as using such compound at ٠.١ and ٠.٢ %. Therefore, the recommended frequency and concentration of such compound were thrice and ٠.١ %, respectively. The best results with regard to quality of the berries were obtained when the vines were treated thrice with amino acids enriched with N, P and K at ٠.١ %. Unfavourable effects on quality parameters were observed on the untreated vines. These results were true during the three seasons.

The positive action of amino acids and nutrients on the biosynthesis and translocation of organic foods especially carbohydrates surely reflected on advancing fruit maturity and enhancing quality of the fruits. The results of Ahmed and Abd El- Hameed (٢٠٠٣), Amin (٢٠٠٧) and Sayed- Heba (٢٠١٠) confirmed the present results regarding the promotive effects of amino acids on the quality of berries. The promotive effects of nutrients on quality of berries was revealed by Sayed (٢٠٠٢); Abd El- Hameed (٢٠٠٥) and Abd El- Wahab (٢٠١٠).

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As a conclusion, treating Red Roomy grapevine thrice with a mixture containing five amino acids namely; methionene, tryptophane, cystene, cysteine and lysine enriched with N, P and K at 1% is considered beneficial for solving the problem of cluster loosness and shot berries in the same time improving the yield quantitatively and qualitatively.

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تأثير بعض الأحماض الأمينية المزودة ببعض العناصر الغذائية علي الاثمار في
كرمات العنب الرومي الأحمر

أسماء أنور ابراهيم

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تم دراسة استجابة النمو والحالة الغذائية للكرمات وكمية المحصول والخصائص الطبيعية والكيميائية لحبات العنب الرومي الأحمر لاستخدام خمسة أحماض أمينية (المثيونين، التربتوفان، والسيستين، والسيستين، والليسين) مزودة بعناصر النيتروجين والفوسفور والبوتاسيوم مرتان ، وثلاثة مرات أو أربعة مرات بتركيز صفر ، ٠.٠٥ ، ٠.١ ، ٠.٢ % وذلك خلال مواسم ٢٠٠٨ ، ٢٠٠٩ ، ٢٠١٠ . أشارت نتائج الدراسة الي أن زيادة عدد مرات الرش والتركيزات المستخدمة للأحماض الأمينية المزودة بالعناصر الغذائية صاحبها تحسن تدريجي في صفات النمو الخضري والعناصر الغذائية في الأوراق وكمية المحصول والخصائص الطبيعية والكيميائية في الحبات. وفي معظم الحالات فان زيادة عدد مرات الاستخدام من ثلاثة الي أربعة أو التركيز من ٠.١ الي ٠.٢ % كان له تأثير طفيف في تحسين الصفات تحت الدراسة. إن معاملة كرمات العنب الرومي الأحمر ثلاث مرات بمخلوط من الأحماض الأمينية يحتوي علي المثيونين، التربتوفان، والسيستين، والسيستين، والليسين بالإضافة الي عناصر النيتروجين والفوسفور والبوتاسيوم بتركيز ٠.١ % يكون ضروريا لتحسين كمية المحصول كما ونوعا.

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