Minia J. of Agric. Res. & Develop.
Vol. (٣٢) No. ٧ pp ١١٢٣-١١٤٣, ٢٠١٢

FACULTY OF AGRICULTURE

APPLICATION OF PLANT COMPOST ENRICHED WITH SOME MICROORGANISMS AS A PARTIAL REPLACEMENT FOR MINERAL N FERTILIZERS IN CRIMSON SEEDLESS GRAPEVINES

M. R. G. El- Kareem[*]; F. F. Ahmed[**]; M. A. Hussein[*] and A. E. M. Madian[**]

[*] Hort. Dept. Fac. of Agric. Souhag Univ. Egypt.
[**] Hort. Dept. Fac. of Agric. Minia Univ. Egypt.

Received ١٢ Nov. ٢٠١٢ Accepted ١٧ Dec. ٢٠١٢

ABSTRACT

Crimson seedless grapevines were fertilized with the suitable N (٨٠ g N/ vine/ year) either completely via inorganic form or at ٢٥ to ٧٥ % inorganic N plus plant compost enriched with one of microorganism strain. Seven microorganism strains namely *Bacillus polymyxa, actinomyces, Spirulina plantensis,* EM, *Azospirillum sp, Bacillus circulanse* and *Azotobacter vinelandii* were used during ٢٠١١ and ٢٠١٢ seasons. The study focused on examining the effect of these N management on growth, vine nutritional status and fruiting of the vines.

Results showed that reducing inorganic N percentage from ١٠٠ to ٥٠ % and increasing percentages of the enriched plant compost with microorganisms caused a gradual promotion on main shoot length, leaf area, leaf N %, berry setting %, yield and cluster weight. Berry weight, red coloured berries %, leaf content of P & K, Mg, plant pigments, T.S.S %, total sugars %, T.S.S/ acid, dehydrogenase activity, the amount of $CO_{٢}$, total counts of bacteria in the soil gradually enhanced with reducing inorganic N from ١٠٠ to ٢٥ % and increasing the enriched compost percentages from ٠.٠ to ٧٥ %. Enriching plant compost with *actinomyces, Bacillus polymyxa, Spirulina plantensis, Bacillus*

***circulanse, Azospirillum sp, Azotobacter vinelandii* and EM, in ascending order was very effective in this respect. Negative effects on fruiting were observed with using inorganic N at percentages lower than ٥٠ % of the suitable N.**

Fertilizing Crimson seedless grapevines with N at ٨٠ g/ vine/ year via ٥٠ % inorganic N plus ٥٠ % compost enriched with EM was suggested to be beneficial for improving yield quantitively and qualitatively. At the same time this treatment reduced the problem of uneven colouration of clusters and pollution of the berries with nitrite.

INTRODUCTION

Crimson seedless grapevine cv. become the preferred red seedless grape in supermarkets worldwide because of their exceptional shelf life. Berries of such cv. have a very distinctive, sweet, juice, flavour and elongated and pal pink berries. Also, grapes have a higher sugar content, with half as glucose and half as fructose. Grapes also, contain adequate amounts of potassium, vitamin A and dietary fiber (Passingham, ٢٠٠٤). Such grapevine cv. is considered a prime and popular grape cv. successfully grown under Egypt conditions. It pruns with cane system. The dangerous drawback of such grapevine cv. is the uneven colouration of clusters as well as the poor berry setting % (Jakson, ١٩٨٨). Such defects greatly declined marketing of this cv. in the local and foreign markets. Adjusting the amount of N in vineyards as mentioned by many authors and pomolgists was found to control growth and alleviate the undesirable phenomena occurred in berry characteristics (Weaver, ١٩٧٦). Many trials had shown the important of organic and biofertilization as a partial replacement of mineral N in fruit orchards (Kannaiyan, ٢٠٠٢). Controlling the uptake of N by organic and biofertilization was accompanied with enhancing yield quantitively and qualitatively as well as checking undesirable phenomena and environment pollution (Dahama, ١٩٩٩).

Previous studies confirmed the beneficial effects of controlling the uptake of N by using organic and biofertilization on fruiting of grapevines cvs. All studies advised to use N through all sources i.e. inorganic, organic and bioforms (Seleem- Basma and Telep, ٢٠٠٨;

Eman *et al.*, ٢٠٠٨; Madian, ٢٠١٠; Uwakiem, ٢٠١١; Abada *et al.*, ٢٠١٠; Abd El- Hameed *et al.*, ٢٠١٠; Abd El- Aziz, ٢٠١١; Ahmed *et al.*, ٢٠١٢a and ٢٠١٢b).

The goal of this study was examining the effect of different proportions of inorganic N as well as plant compost enriched with some microorganisms on yield and quality of Crimson seedless grapevines. Selecting the best mineral N proportion and microorganisms applied with plant compost that responsible for enhancing yield and berries quality was considered as another target.

MATERIALS AND METHODS

This study was carried out during ٢٠١١ and ٢٠١٢ seasons on ١٣٢ uniform in vigour ٦- years old Crimson seedless grapevines (own rooted). The vines are grown in clay soil and planted at ٢ × ٣ meters apat in a private vineyard located at Matay district, Minia Governorate. The chosen vines were irrigated with surface irrigation. Winter pruning was done at the middle of Jan. by using cane pruning method with Gable shape supporting system leaving ٧٢ eyes/ vine (on the basis of six fruiting canes × ten eyes + six renewal spurs × two eyes).

Table ١: Analysis of the soil at the trial location:

Constituents	Values
Sand %	: ٤.٥
Silt %	: ١٥.٥
Clay %	: ٨٠.٠
Texture	: Clay
pH (١:٢.٥ extract)	: ٧.٩١
E.C (١: ٢.٥ extract) (mmhos/ ١ cm ٢٥° C)	: ١.٠٠
$CaCO_{٣}$ %	: ١.٧٩
Total N %	: ٠.٠٧
Available K (ammonium acetate, ppm)	: ٤٠٠
Available P (Olsen method, ppm)	: ٥.١

All the selected vines received regular horticultural practices expect those dealing the application of inorganic, organic and biofertilization.

The present work included the following twenty two treatments:

١. Application of the suitable N (٨٠ g N/ vine/ year) completely via inorganic N ammonium sulphate (٢٠.٦ % N) (٣٨٨ g/ vine).

٢. Application of ٧٥ % of the suitable N via inorganic form (٢٩١ g ammonium sulphate/ vine) + ٢٥ % plant compost (٢.٠ % N) enriched with Bacillus polymyxa (١.٠ kg compost/ vine).

٣. Application of ٧٥ % of the suitable N via inorganic form (٢٩١ g ammonium sulphate/ vine) + ٢٥ % plant compost enriched with actinomyces (١.٠ kg/ vine).

٤. Application of ٧٥ % of the suitable N via inorganic form + ٢٥ % plant compost enriched with Spirulina plantensis (١.٠ kg/ vine).

٥. Application of ٧٥ % of the suitable N via inorganic form + ٢٥ % plant compost enriched with EM (effective microorganisms) (٨٠٠ g/ vine).

٦. Application of ٧٥ % of the suitable N via inorganic form + ٢٥ % plant compost enriched with Azospirillum sp (٨٩٠ g/ vine).

٧. Application of ٧٥ % of the suitable N via inorganic form + ٢٥ % plant compost enriched with Bacillus circulanse (٨٩٠ g/ vine).

٨. Application of ٧٥ % of the suitable N via inorganic form + ٢٥ % plant compost enriched with Azotobacter vinelandii (٨٩٠ g/ vine).

٩. Application of ٥٠ % of the suitable N via inorganic form (١٩٤ g ammonium sulphate/ vine) + ٥٠ % plant compost (٢.٠ kg/ vine) enriched with Bacillus polymyxa.

١٠. Application of ٥٠ % of the suitable N via inorganic form + ٥٠ % plant compost enriched with actinomyces (٢.٠ kg/ vine).

١١. Application of ٥٠ % of the suitable N via inorganic form + ٥٠ % plant compost enriched with Spirulina plantensis (٢.٠ kg/ vine).

١٢. Application of ٥٠ % of the suitable N via inorganic form + ٥٠ % plant compost enriched with EM (١.٦ kg/ vine).

١٣. Application of ٥٠ % of the suitable N via inorganic form + ٥٠ % plant compost enriched with Azospirillum sp (١.٧ kg/ vine).

١٤. Application of ٥٠ % of the suitable N via inorganic form + ٥٠ % plant compost enriched with Bacillus circulanse (١.٧ kg/ vine).

١٥. Application of ٥٠ % of the suitable N via inorganic form + ٥٠ % plant compost enriched with Azotobacter vinelandii (١.٧ kg/ vine).

Application of plant compost enriched with some microorganisms

١٦. Application of ٢٥ % of the suitable N via inorganic form (١٧٩ g ammonium sulphate/ vine) + ٧٥ % plant compost (٣.٠ kg/ vine) enriched with Bacillus polymyxa.

١٧. Application of ٢٥ % of the suitable N via inorganic form + ٧٥ % plant compost enriched with actinomyces (٣.٠ kg/ vine).

١٨. Application of ٢٥ % of the suitable N via inorganic form + ٧٥ % plant compost enriched with Spirulina plantensis (٣.٠ kg/ vine).

١٩. Application of ٢٥ % of the suitable N via inorganic form + ٧٥ % plant compost enriched with EM (٢.٤ kg/ vine).

٢٠. Application of ٢٥ % of the suitable N via inorganic form + ٧٥ % plant compost enriched with Azospirillum sp (٢.٦٧ kg/ vine).

٢١. Application of ٢٥ % of the suitable N via inorganic form + ٧٥ % plant compost enriched with Bacillus circulanse (٢.٦٧ kg/ vine).

٢٢. Application of ٢٥ % of the suitable N via inorganic form + ٧٥ % plant compost enriched with Azotobacter vinelandii (٢.٦٧ kg/ vine).

Each treatment was replicated three times, two vines per each.

Table ٢: Analysis of untreated plant compost:

Character	Values
Moisture %	: ٢٦.٦
pH (١:٢.٥ extract)	: ٨.٢
E.C (١: ٢.٥ extract) (mmhos/ ١ cm ٢٥° C)	: ٤.١
O.M. %	: ٦٥
Total N %	: ٢.٠
Total P %	: ١.٥
Total K %	: ١.٣
Available micronutrients (ppm)	
Fe (ppm)	: ١٠٢.٥
Mn (ppm)	: ١١٥.٠
Cu (ppm)	: ١٨٠.٠
Zn (ppm)	: ٢٨.٠

Preparation of plant compost enriched with biofertilizers:

Different layers of plant wastes namely leaves of bananas (٥٠٠ kg), old Farm yard manure (F.Y.M.) (١٠٠٠ kg), clover (١٠٠ kg) and clay (١٠٠ kg) and one of the seven biofertilizers ٥٠ ml *Bacillus polymyxa* containing ١٠×١٠^{٥} cell, ٥٠ ml *actinomyces,* ٥٠ ml

Spirulina plantensis containing ١٠×١٠^{٦} cell, ٥٠ ml Effective microorganisms containing ٥٠ ml *Azospirillum sp* containing ١٠×١٠^{٨} cells, ٥٠ ml *Bacillus circulanse* containing ١٠×١٠^{٩} or *Azotobacter vinelandii* containing ١٠×١٠^{٩} cells were put above ground in pile with area of ٣ m length, ٣ m width and ٢.٥ m height. Afterwards, pile components were stirred repeatly every one week with adjusting moisture content till they ripened where temperature was lowered. These types of enriched composts were analyzed and used.

Table ٣: Analysis of different types of compost:

Types of compost	Values			
	OM %	N %	P %	K %
Compost enriched with *Bacillus polymyxa*	٦٠.٥	٢.٠٠	٠.٣٣	٠.٢٩
Compost enriched with *actinomyces*	٦٠.٠	٢.٠٠	٠.٣٠	٠.٢٧
Compost enriched with *Spirulina plantensis*	٦١.٠	٢.٠٠	٠.٣٥	٠.٣١
Compost enriched with EM	٦٥.٠	٢.٥٠	٠.٤٠	٠.٤٤
Compost enriched with *Azospirillum sp*	٦٢.٣	٢.٢٥	٠.٣٨	٠.٣٥
Compost enriched with *Bacillus circulanse*	٦١.٦	٢.٢٥	٠.٣٦	٠.٣٣
Compost enriched with *Azotobacter vinelandii*	٦٣.٤	٢.٢٥	٠.٣٩	٠.٣٧

All types of compost were applied once after winter pruning in large higs beyond the trunk of each vine. Mineral N fertilizer was spitted into three unequal batches, ٥٠ % at growth start (١st of April), ٢٥ % just after berry setting % (١st week of June) and ٢٥ % at one month later (١st week of July). Complete randomized block design was adopted.

Main shoot length (cm.) and leaf area (cm^{٢}) (according to Ahmed and Morsy, ١٩٩٩) were recorded at the middle of July during both seasons.

Twenty leaves picked from the leaves opposite to the basal clusters for each vine (according to Balo *et al.*, ١٩٨٨) were selected for determining plant pigments (in the first leaves) namely chlorophyll a & b, total chlorophylls and total carotenoids (mg/ ١٠٠ g F.W) (according to Fadl and Sari El- Deen, ١٩٧٨). Dried petioles were saved for determining of N, P, K & Mg (as percentages) and Zn, Fe, Mn and Cu (as ppm) according to the method that outlined by Chapman and Pratt (١٩٦٥).

Berry set % was calculated by dividing the number of attached berries/ cluster by total number of flowers (attached fruitlets + dropped flowers + dropped fruitlets in the bags) and multiplying the product by ١٠٠.

Harvesting took place when T.S.S/ acid in the berries of the check treatment reached at least ٢٥: ١ (middle of Sept.) (according to Weaver, ١٩٧٦). Yield expressed in number of clusters/ vine and weight (kg.) was recorded.

Five clusters from each vine were taken at random for determination of cluster weight (g.), berry weight (g.), red coloured berries % (by dividing number of red berries by total number of berries/ cluster and multiplying the product by ١٠٠), T.S.S %, total sugars % (Lane and Eynon, ١٩٦٥), total acidity % (as g tartaric acid/ ١٠٠ ml juice) and T.S.S/ acid (A.O.A.C., ١٩٩٥).

At the end of the study, the amount of CO٢ (mg/ ١٠٠ g soil, (Paul and Clark, ١٩٩٦), dehydrogenase activity (μ TPF/ ١.٠ g soil/ one hour) (Casida *et al*., ١٩٦٤) and total counts of bacteria (١.٠ g soil) (according to Cochran, ١٩٥٠ and Abd El- Malek and Ishac, ١٩٦٥) were determined. Nitrite (ppm) in the juice was determined (according to Ridnour- Lisa *et al*., ٢٠٠٠).

Statistical analysis was done according to Mead *et al*., (١٩٩٣). Comparisons between treatments means were made by using new L.S.D at ٠.٠٥.

RESULTS AND DISCUSSION

١- Growth characters:-

It is clear from the data in Table (٤) that varying percentages of inorganic N and plant compost enriched with various microorganisms had significant effect on growth characters. Fertilizing the vines with the suitable N (٨٠ g/ vine) through ٥٠ to ٧٥ % inorganic N plus compost enriched with different microorganism at ٢٥ to ٥٠ % significantly stimulated the leaf area and shoot length in comparison to supplying the vines with N completely via inorganic from or using inorganic N at percentages lower than ٥٠ % (٢٥ %). Using N completely via mineral N was superior than using N via mineral N at percentages lower than ٥٠ % in enhancing such two growth characters. A significant reduction was observed with using N via mineral N source at ٢٥ %. Combined application of N through inorganic N at ٥٠ to ٧٥ % plus compost enriched with microorganisms surpassed the application of N via mineral N alone. Varying microorganism applied with plant compost had significant effect on such two growth traits. In ascending order enriching plant compost with *actinomyces, Bacillus polymyxa, Spirulina plantensis, Bacillus circulanse, Azospirillum sp, Azotobacter vinelandii* and EM was significantly very effective in stimulating growth characters. Fertilizing the vines with N through ٥٠ % inorganic + plant compost enriched with EM at ٥٠ % gave the maximum values. The lowest values were recorded with using N via ٢٥ % inorganic N + plant compost enriched with *actinomyces* at ٧٥ %. These results were similar during both seasons.

The beneficial effect of organic and biofertilization on improving soil fertility in terms of reducing soil pH and salinity as well as enhancing organic matter, natural hormones, antibiotics, plant resistant against various diseases and the availability and uptake of nutrients could explain the present results (Dahama, ١٩٩٩ and Kannaiyan, ٢٠٠٢).

These results are in harmony with those obtained by Ahmed *et al*., (٢٠١٢a) and (٢٠١٢b).

٢- Leaf content of N:-

Data in Table (٤) showed that supplying the vines with N through ٥٠ to ٧٥ % inorganic N along with application of plant compost and microorganism significantly enhanced leaf content of N. Application of N completely via inorganic form or using N at percentages lower than ٥٠ % even with application of biofertilizers resulted in lower values. The application of N as mineral source at ١٠٠ % of the suitable N significantly stimulated N when compared with using N at mineral source at percentages lower than ٢٥ %. In ascending order, the efficiency of microorganisms applied with plant compost on enhancing leaf content of N could be arranged as follows, *actinomyces, Bacillus polymyxa, Spirulina plantensis, Bacillus circulanse, Azospirillum sp, Azotobacter vinelandii* and EM. The best microorganism was EM, followed by *Azotobacter vinelandii*. Actinomyces occupied the last position in this respect. Using N via ٥٠ % mineral N + compost enriched with EM at ٥٠ % effectively maximized leaf N content. The lowest values of N was recorded with supplying the vines with N through ٢٥ % mineral source + ٧٥ % plant compost enriched with *actinomyces*. Similar results were observed during both seasons.

The beneficial effect of using organic and biofertilization on enhancing the leaf content of N was mainly attributed to their positive action on increasing N fixation and the availability of N (Dahama, ١٩٩٩ and Kannaiyan, ٢٠٠٢).

The results of Uwakiem (٢٠١١) and Ahmed *et al.,* (٢٠١٢c) emphasized the present results.

٣- Leaf content of P, K, Mg, Zn, Fe, Mn, Cu and pigment:-

It is clear from the data in Tables (٤ & ٥) that application of N through ٢٥ to ٧٥ % inorganic along with all plant composts enriched with microorganisms at ٢٥ to ٧٥ % significantly enhanced nutrients in the leaves (P, K, Mg, Zn, Fe, Mn and Cu).Also, plant pigment was supported in relative to using N completely via inorganic form. The stimulation on these mineral and organic nutrients was associated with reducing inorganic N form ١٠٠ to ٢٥ % and at the same time increasing percentages of plant compost enriched with microorganisms from ٠.٠ to ٧٥ % from ٠.٠ to ٧٥.٠ %. The promotive effect of the seven microorganisms applied with compost on these nutrients was arranged as follows in ascending order *actinomyces, Bacillus polymyxa, Spirulina plantensis, Bacillus circulanse, Azospirillum sp, Azotobacter vinelandii* and EM.

Fertilizing the vines with N as ٢٥ % inorganic N plus ٧٥ % plant compost enriched with EM at ٧٥ % effectively maximized these nutrients. The minimum values were recorded on the vines that received N completely via inorganic form. Similar results were declared during both seasons.

Table ٤: Effect of inorganic N and compost enriched with different microorganisms on leaf area, main shoot length and leaf content of N, P, K, Mg and Zn of Crimson seedless grapevines during ٢٠١١ and ٢٠١٢ seasons.

Treatment	Leaf area (cm^{٢})		Main shoot length (cm.)		Leaf N %		Leaf P %		Leaf K %		Leaf Mg %		Leaf Zn (ppm)	
	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢
١٠٠ % inorganic fertilizer	١٠٩.٠	١١٠.٠	١٠٧.١	١٠٧.٩	١.٦٩	١.٨٥	٠.١١	٠.١١	١.٢٩	١.٣٠	٠.٥١	٠.٥٠	٥٠.٠	٥٠.٢
٧٥ % inorganic+٢٥ % compost *B. polymyxa*	١١٢.٣	١١٣.٢	١١٠.٢	١١١.٠	١.٨١	١.٩٠	٠.١٤	٠.١٣	١.٤٣	١.٣٦	٠.٥٦	٠.٥٢	٥٤.١	٥٥.٢
٧٥ % inorganic+٢٥ % compost *actinomyces*	١١١.٠	١١٢.٤	١٠٩.١	١٠٩.٩	١.٧٤	١.٨٢	٠.١٢	٠.١١	١.٣٧	١.٣٠	٠.٥٤	٠.٥٠	٥٢.٠	٥٣.١
٧٥ % inorganic+٢٥ % compost *S. plantensis*	١١٣.٢	١١٤.٣	١١١.٢	١١٢.٠	١.٨٧	١.٩٦	٠.١٦	٠.١٥	١.٥٠	١.٤٣	٠.٥٨	٠.٥٤	٥٦.٢	٥٧.٣
٧٥ % inorganic+٢٥ % compost EM	١٢١.٠	١٢٢.١	١١٩.١	١٢٠.٠	٢.١٩	٢.٢٩	٠.٢٨	٠.٢٧	١.٧٥	١.٦٨	٠.٦٩	٠.٦٥	٦٢.٠	٦٣.٠
٧٥ % inorganic+٢٥ % compost *Azopspirillum*	١١٦.٣	١١٧.٤	١١٤.٥	١١٥.٣	٢.٠١	٢.١٠	٠.٢٢	٠.٢١	١.٦٢	١.٥٥	٠.٦٣	٠.٥٩	٥٩.٠	٦٠.١
٧٥ % inorganic+٢٥ % compost *B. circulanse*	١١٤.٥	١١٥.٤	١١٢.٦	١١٣.٣	١.٩٥	٢.٠٤	٠.١٩	٠.١٨	١.٥٥	١.٤٨	٠.٦٠	٠.٥٦	٥٨.٣	٥٩.٤
٧٥ % inorganic+٢٥ % compost *A. vinelandii*	١١٨.٩	١٢٠.٠	١١٦.٩	١١٧.٧	٢.٠٧	٢.١٦	٠.٢٥	٠.٢٣	١.٧٠	١.٦٣	٠.٦٦	٠.٦٢	٦٠.٠	٦١.١
٥٠ % inorganic+٢٥ % compost *B. polymyxa*	١٢٤.١	١٢٥.٢	١٢٢.٠	١٢٢.٨	٢.٣٤	٢.٤٣	٠.٣٥	٠.٣٤	١.٩٠	١.٨٣	٠.٧٣	٠.٦٩	٦٦.٠	٦٧.١
٥٠ % inorganic+٢٥ % compost *actinomyces*	١٢٢.٩	١٢٤.٠	١٢٠.٧	١٢١.٥	٢.٢٩	٢.٣٨	٠.٣١	٠.٣٠	١.٨٢	١.٧٧	٠.٧١	٠.٦٧	٦٤.٠	٦٥.٢
٥٠ % inorganic+٢٥ % compost *S. plantensis*	١٢٦.٢	١٢٧.٢	١٢٤.٢	١٢٥.٠	٢.٤١	٢.٥٠	٠.٣٧	٠.٣٦	١.٩٥	١.٨٨	٠.٧٥	٠.٧١	٦٨.٠	٦٩.١
٥٠ % inorganic+٢٥ % compost EM	١٢٩.٣	١٣٠.٣	١٢٧.٢	١٢٨.٠	٢.٧٦	٢.٨٥	٠.٥٠	٠.٥١	٢.١٥	٢.٠٨	٠.٨٦	٠.٨٢	٧٧.٢	٧٨.٣
٥٠ % inorganic+٢٥ % compost *Azopspirillum*	١٢٨.٠	١٢٩.٠	١٢٦.١	١٢٦.٩	٢.٥٥	٢.٦٦	٠.٤٣	٠.٤٤	٢.٠٥	١.٩٨	٠.٨٠	٠.٧٦	٧٢.٣	٧٣.٥
٥٠ % inorganic+٢٥ % compost *B. circulanse*	١٢٧.١	١٢٨.١	١٢٥.٠	١٢٥.٨	٢.٤٨	٢.٥٦	٠.٤٠	٠.٤٠	٢.٠٠	١.٩٣	٠.٧٧	٠.٧١	٧٠.٠	٧١.٢
٥٠ % inorganic+٢٥ % compost *A. vinelandii*	١٢٩.٠	١٣٠.١	١٢٧.٠	١٢٧.٩	٢.٦٩	٢.٧٨	٠.٤٦	٠.٤٥	٢.١٠	٢.٠٣	٠.٨٢	٠.٧٨	٧٥.٠	٧٦.٢
٢٥ % inorganic+٢٥ % compost *B. polymyxa*	١٠٠.١	١٠١.٢	٩٨.٢	٩٩.٠	١.٤٦	١.٥	٠.٥٥	٠.٥٤	٢.٣٠	٢.٢٣	٠.٩٢	٠.٨٨	٨٢.٠	٨٢.٩
٢٥ % inorganic+٢٥ % compost *actinomyces*	٩٥.٠	٩٦.١	٩٣.١	٩٤.٠	١.٤١	١.٥٠	٠.٥٢	٠.٥١	٢.٢١	٢.١٤	٠.٨٩	٠.٨٥	٨٠.٠	٨١.٠
٢٥ % inorganic+٢٥ % compost *S. plantensis*	١٠٠.٩	١٠٢.٠	٩٨.٧	٩٩.٥	١.٥١	١.٦٠	٠.٥٨	٠.٥٧	٢.٣٦	٢.٣٠	٠.٩٣	٠.٦٩	٨٥.٠	٨٦.٢
٢٥ % inorganic+٢٥ % compost EM	١٠٦.٢	١٠٧.٣	١٠٤.٠	١٠٤.٩	١.٧٢	١.٨١	٠.٦٩	٠.٦٨	٢.٦٢	٢.٥٦	٠.٩٧	٠.٩٢	٩٥.٠	٩٦.٢
٢٥ % inorganic+٢٥ % compost *Azopspirillum*	١٠٣.٣	١٠٤.٢	١٠١.٢	١٠٢.٠	١.٥٩	١.٦٨	٠.٦٤	٠.٦٣	٢.٥٠	٢.٤٣	٠.٩٥	٠.٩٠	٩٠.٠	٩١.٣
٢٥ % inorganic+٢٥ % compost *B. circulanse*	١٠٢.٠	١٠٣.١	١٠٠.٠	١٠١.٠	١.٥٥	١.٦٥	٠.٦١	٠.٦٠	٢.٤٢	٢.٣٦	٠.٩٤	٠.٩٠	٨٧.٠	٨٨.٠

٢٥ % inorganic+٢٥ % compost *A. vinelandii*	١٠٥.٠	١٠٦.٠	١٠٣.٣	١٠٤.٣	١.٦٦	١.٧٤	٠.٦٦	٠.٦٥	٢.٥٥	٢.٤٨	٠.٩٦	٠.٩٢	٩٢.٠	٩٣.١
New L.S.D at ٥ %	٠.٧	٠.٨	٠.٧	٠.٦	٠.٠٤	٠.٠٣	٠.٠٢	٠.٠٢	٠.٠٥	٠.٠٥	٠.٠٢	٠.٠٢	١.١	١.٣

Table ٥: Effect of inorganic N and compost enriched with different microorganisms on the leaf content of Mn, Fe and Cu as well as some plant pigments of Crimson seedless grapevines during ٢٠١١ and ٢٠١٢ seasons.

Treatment	**Leaf Mn (ppm)**		**Leaf Fe (ppm)**		**Leaf Cu (ppm)**		**Chlorophyll a (mg/ ١٠٠ g F.W)**		**Chlorophyll b (mg/ ١٠٠ g F.W)**		**Total chlorophylls (mg/ ١٠٠ g F.W)**		**Total carotinoids (mg/ ١٠٠ g F.W)**	
	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢
١٠٠ % inorganic fertilizer	٥٩.١	٦٠.٠	٦٠.٠	٦٠.٩	٢.٤	٣.٠	١١.٢	١٢.١	٢.٩	٣.٢	١٤.١	١٥.٣	١.٩	٢.٨
٧٥ % inorganic+٢٥ % compost *B. polymyxa*	٦٢.٠	٦٢.٨	٦٢.٩	٦٣.٨	٢.٧	٣.٣	١١.٦	١٢.٥	٣.٣	٣.٦	١٤.٩	١٦.١	٢.٢	٣.١
٧٥ % inorganic+٢٥ % compost *actinomyces*	٦٠.٦	٦١.٤	٦١.٥	٦٢.٤	٢.٦	٣.٢	١١.٤	١٢.٣	٣.١	٣.٤	١٤.٥	١٥.٧	٢.١	٣.٠
٧٥ % inorganic+٢٥ % compost *S. plantensis*	٦٣.٥	٦٤.٤	٦٤.٤	٦٥.٣	٢.٨	٣.٤	١١.٨	١٢.٧	٣.٦	٣.٩	١٥.٤	١٦.٦	٢.٣	٣.٢
٧٥ % inorganic+٢٥ % compost EM	٧١.٠	٧١.٩	٧١.٩	٧٣.٠	٣.٤	٤.٠	١٢.٨	١٢.٧	٤.٨	٥.٠	١٧.٦	١٧.٧	٢.٧	٣.٦
٧٥ % inorganic+٢٥ % compost *Azopspirillum*	٦٦.٢	٦٧.٠	٦٧.٠	٦٧.٠	٣.١	٣.٧	١٢.٢	١٣.١	٤.٢	٤.٥	١٦.٤	١٧.٦	٢.٥	٣.٤
٧٥ % inorganic+٢٥ % compost *B. circulanse*	٦٥.٠	٦٦.٠	٦٥.٩	٦٦.٥	٢.٩	٣.٥	١٢.٠	١٢.٨	٣.٩	٤.١	١٥.٩	١٦.٩	٢.٤	٣.٣
٧٥ % inorganic+٢٥ % compost *A. vinelandii*	٦٨.٤	٦٩.٣	٦٩.٤	٧٠.٦	٣.٣	٣.٩	١٢.٥	١٣.٤	٤.٥	٤.٨	١٧.٠	١٨.٢	٢.٦	٣.٥
٥٠ % inorganic+٢٥ % compost *B. polymyxa*	٧٤.٠	٧٤.٩	٧٤.٩	٧٥.٨	٣.٨	٤.٤	١٣.٣	١٤.٢	٥.٢	٥.٥	١٨.٥	١٩.٧	٣.١	٤.٠
٥٠ % inorganic+٢٥ % compost *actinomyces*	٧٢.٥	٧٣.٤	٧٣.٤	٧٤.٤	٣.٧	٤.٣	١٣.٠	١٣.٩	٥.٠	٥.٣	١٨.٠	١٩.٢	٢.٩	٣.٨
٥٠ % inorganic+٢٥ % compost *S. plantensis*	٧٥.١	٧٦.٠	٧٦.٠	٧٧.٠	٣.٩	٤.٥	١٣.٦	١٤.٥	٥.٥	٥.٨	١٩.١	٢٠.٣	٣.٣	٤.٢
٥٠ % inorganic+٢٥ % compost EM	٨١.٩	٨٢.٠	٨٢.٨	٨٣.٨	٤.٦	٥.٢	١٥.٠	١٥.٩	٦.٩	٧.٢	٢١.٩	٢٣.١	٤.٠	٤.٨
٥٠ % inorganic+٢٥ % compost *Azopspirillum*	٧٨.٠	٧٨.٩	٧٨.٨	٧٩.٩	٤.٢	٤.٨	١٤.٤	١٥.٣	٦.١	٦.٥	٢٠.٥	٢١.٨	٣.٦	٤.٥
٥٠ % inorganic+٢٥ % compost *B. circulanse*	٧٦.٢	٧٧.٠	٧٧.٠	٧٨.٠	٤.٠	٤.٦	١٤.٠	١٤.٩	٥.٩	٦.٢	١٩.٩	٢١.٢	٣.٥	٤.٤
٥٠ % inorganic+٢٥ % compost *A. vinelandii*	٨٠.٠	٨٠.٩	٨٠.٩	٨١.٩	٤.٤	٥.٠	١٤.٦	١٥.٥	٦.٤	٦.٧	٢١.٠	٢١.٩	٣.٨	٤.٧
٢٥ % inorganic+٢٥ % compost *B. polymyxa*	٨٦.٠	٨٦.٩	٨٦.٨	٨٧.٧	٥.٢	٥.٨	١٥.٦	١٦.٥	٨.٠	٨.٣	٢٣.٦	٢٤.٨	٤.٥	٥.٤
٢٥ % inorganic+٢٥ % compost *actinomyces*	٨٤.٠	٨٤.٧	٨٥.٠	٨٦.٠	٥.٠	٥.٦	١٥.٣	١٦.٢	٧.٥	٧.٨	٢٢.٨	٢٤.٠	٤.٢	٥.٢
٢٥ % inorganic+٢٥ % compost *S. plantensis*	٨٧.٠	٨٨.٠	٨٩.٠	٩٠.٣	٥.٥	٦.١	١٦.٠	١٦.٨	٨.٦	٩.٠	٢٤.٦	٢٥.٨	٤.٨	٥.٧
٢٥ % inorganic+٢٥ % compost EM	٩٤.١	٩٥.٠	٩٥.١	٩٦.١	٦.٤	٧.١	١٨.٣	١٩.٢	١٠.٤	١٠.٧	٢٨.٧	٢٩.٩	٥.٩	٦.٨

٢٥ % inorganic+٢٥ % compost *Azopspirillum*	٩١.٥	٩٢.٤	٩٢.٥	٩٣.٥	٥.٩	٦.٥	١٧.٠	١٧.٨	٩.٥	٩.٨	٢٦.٥	٢٧.٦	٥.٢	٦.١
٢٥ % inorganic+٢٥ % compost *B. circulanse*	٩٠.٠	٩٠.٨	٩٠.٩	٩١.٩	٥.٧	٦.٣	١٦.٦	١٧.٥	٩.٠	٩.٣	٢٥.٦	٢٦.٨	٥.٠	٥.٩
٢٥ % inorganic+٢٥ % compost *A. vinelandii*	٩٣.٠	٩٤.٠	٩٤.٩	٩٥.٩	٦.٠	٦.٦	١٧.٥	١٨.٤	٩.٩	١٠.٢	٢٧.٤	٢٨.٦	٥.٥	٦.٥
New L.S.D at ٥ %	١.١	١.٢	١.٠	٠.٩	٠.٢	٠.٢	٠.٢	٠.٢	٠.٢	٠.٢	٠.٢	٠.٢	٠.٢	٠.٢

The beneficial effect of organic and biofertilization on enhancing soil fertility and lowering soil pH effectively enhanced uptake of nutrients and building of pigments which may explain the present results. The higher own content of organic fertilizers from different nutrients could give another explanation.

These results are in agreement with those obtained by Abada *et al.*, (٢٠١٢) and Ahmed *et al.*, (٢٠١٢a).

٤- Berry set, yield and cluster weight:-

Data in Table (٦) obviously show that using N through ٥٠ to ٧٥ % inorganic N plus ٢٥ to ٥٠ % plant composts enriched with various microorganisms significantly improved berry setting %, yield expressed in weight number of clusters/ vine and cluster weight in comparison to using N completely via inorganic form or when mineral N was applied at percentages lower than ٥٠ %. Using N as ٢٥ % inorganic N plus ٧٥ % plant compost enriched with any microorganism significantly reduced berry setting %, yield and cluster weight comparing with using N completely via inorganic form. Enriching plant compost with *actinomyces, Bacillus polymyxa, Spirulina plantensis, Bacillus circulanse, Azospirillum sp, Azotobacter vinelandii* and EM in ascending order was significantly very effective in improving the berry setting %, yield and cluster weight. The best three biofertilizers applied with compost were EM, *Azotobacter vinelandii* and *Azospirillum sp.*

A significant decline on the berry setting, yield and cluster was observed with reducing percentages of inorganic N form from ٥٠ to ٢٥ % even with the application of different plant composts. The present treatments had no significant effect on the number of clusters per vine in the first season of study. The best results were revealed with using the suitable N through ٥٠ % inorganic form plus ٥٠ % plant compost enriched with EM. Under such promised treatment, yield reached ٩.٦ and ١١.٤ while was the lowest (٦.٥ and ٦.٦ kg.) in vines treated with N via ٢٥ % inorganic + ٧٥ % plus compost enriched with actinomyces during both seasons, respectively. These results were true during both seasons.

Table ٦: Effect of inorganic N and compost enriched with different microorganisms on berry setting %, yield, number of clusters, cluster weight, berry weight, red coloured berries % and T.S.S % in the grapes of Crimson seedless grapevines during ٢٠١١ and ٢٠١٢ seasons.

Treatment	Berry setting %		No. of clusters/ vine		Yield/ vine (g.)		Cluster weight (g.)		Berry weight (g.)		Red coloured berries %		T.S.S %	
	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢
١٠٠ % inorganic fertilizer	٩.٥	٩.٨	٢١.٠	٢٧.٠	٧.٤	٩.٣	٣٥١	٣٤٣	٣.٨٠	٣.٧٣	٥٧.٠	٥٧.٦	١٨.٠	١٨.٢
٧٥ % inorganic+٢٥ % compost *B. polymyxa*	١٠.٠	١٠.٣	٢١.٠	٢٨.٠	٧.٧	١٠.١	٣٦٩	٣٦١	٣.٨٦	٣.٧٩	٦٢.٠	٦٣.١	١٨.٥	١٨.٨
٧٥ % inorganic+٢٥ % compost *actinomyces*	٩.٨	١٠.١	٢١.٠	٢٨.٠	٧.٦	٩.٩	٣٦٠	٣٥٢	٣.٨٣	٣.٧٦	٦٠.٠	٦١.٣	١٨.٢	١٨.٥
٧٥ % inorganic+٢٥ % compost *S. plantensis*	١٠.٢	١٠.٥	٢١.٠	٢٩.٠	٧.٨	١٠.٥	٣٧٠	٣٦٢	٣.٩٠	٣.٨٣	٦٤.٠	٦٥.٣	١٩.٢	١٩.٥
٧٥ % inorganic+٢٥ % compost EM	١١.٢	١١.٥	٢١.٠	٣٢.٠	٨.٤	١٢.٦	٤٠١	٣٩٣	٤.٠١	٣.٩٤	٧٤.٠	٧٥.٣	٢٠.٥	٢٠.٧
٧٥ % inorganic+٢٥ % compost *Azopspirillum*	١٠.٨	١١.١	٢١.٠	٣٠.٠	٨.٢	١١.٦	٣٩٥	٣٨٨	٣.٩٥	٣.٨٨	٦٨.٠	٦٩.٢	٢٠.٠	٢٠.٣
٧٥ % inorganic+٢٥ % compost *B. circulanse*	١٠.٦	١١.٠	٢١.٠	٣٠.٠	٨.٠	١١.٢	٣٨٠	٣٧٢	٣.٩٣	٣.٨٦	٦٦.٠	٦٧.٢	١٩.٥	١٩.٨
٧٥ % inorganic+٢٥ % compost *A. vinelandii*	١١.٠	١١.٤	٢١.٠	٣٠.٠	٨.٤	١١.٨	٤٠٠	٣٩٢	٣.٩٨	٣.٩١	٧١.٠	٧٢.٣	٢٠.٢	٢٠.٥
٥٠ % inorganic+٢٥ % compost *B. polymyxa*	١٢.٠	١٢.٣	٢٢.٠	٣٣.٠	٨.٩	١٣.٠	٤٠٥	٣٩٥	٤.٠٧	٤.٠٠	٧٨.٠	٧٩.١	٢١.٠	٢١.٣
٥٠ % inorganic+٢٥ % compost *actinomyces*	١١.٦	١١.٩	٢٢.٠	٣٣.٠	٨.٩	١٣.٠	٤٠٣	٣٩٣	٤.٠٤	٣.٩٧	٧٦.٠	٧٧.٢	٢٠.٨	٢١.٠
٥٠ % inorganic+٢٥ % compost *S. plantensis*	١٢.٢	١٢.٥	٢٢.٠	٣٣.٠	٩.٠	١٣.٢	٤١٠	٤٠٠	٤.١٠	٤.٠٣	٨٠.٠	٨١.٣	٢١.٣	٢١.٥
٥٠ % inorganic+٢٥ % compost EM	١٣.١	١٣.٤	٢٢.٠	٣٥.٠	٩.٦	١١.٤	٤٣٥	٣٢٧	٤.٢٠	٤.١٣	٨٦.٠	٨٧.٩	٢٢.٥	٢٢.٨
٥٠ % inorganic+٢٥ % compost *Azopspirillum*	١٢.٦	١٢.٩	٢٢.٠	٣٤.٠	٩.٤	١٤.٢	٤٢٥	٤١٧	٤.١٥	٤.٠٨	٨٣.٠	٨٤.١	٢١.٧	٢٢.٠
٥٠ % inorganic+٢٥ % compost *B. circulanse*	١٢.٥	١٢.٨	٢٢.٠	٣٤.٠	٩.٢	١٤.٠	٤٢٠	٤١١	٤.١٢	٤.٠٥	٨٢.٠	٨٣.٤	٢١.٩	٢٢.٨
٥٠ % inorganic+٢٥ % compost *A. vinelandii*	١٢.٨	١٣.١	٢٢.٠	٣٥.٠	٩.٥	١٤.٨	٤٣٠	٤٢٢	٤.١٧	٤.١٠	٨٤.٠	٨٥.٥	٢٢.٠	٢٢.٣
٢٥ % inorganic+٢٥ % compost *B. polymyxa*	٨.١	٨.٤	٢١.٠	٢٣.٠	٦.٧	٧.٢	٣٢٠	٣١١	٤.٢٦	٤.١٦	٨٧.٠	٨٨.٣	٢٣.٠	٢٣.٣
٢٥ % inorganic+٢٥ % compost *actinomyces*	٧.٧	٨.٠	٢١.٠	٢٢.٠	٦.٥	٦.٦	٣١٠	٣٠١	٤.٢٣	٤.١٣	٨٦.٥	٨٨.٠	٢٢.٧	٢٣.٠
٢٥ % inorganic+٢٥ % compost *S. plantensis*	٨.٠	٨.٣	٢١.٠	٢٤.٠	٦.٧	٧.٥	٣٢٠	٣١١	٤.٣٠	٤.٢٠	٨٧.٣	٨٨.٤	٢٣.٢	٢٣.٥
٢٥ % inorganic+٢٥ % compost EM	٩.١	٩.٤	٢٢.٠	٢٦.٠	٧.٥	٨.٦	٣٤٠	٣٣٢	٤.٤٢	٤.٣٩	٨٨.٥	٨٩.٠	٢٤.٠	٢٤.٢
٢٥ % inorganic+٢٥ % compost *Azopspirillum*	٨.٥	٨.٨	٢١.٠	٢٤.٠	٦.٩	٧.٧	٣٣٠	٣٢١	٤.٤٠	٤.٢٧	٨٨.٠	٨٨.٧	٢٣.٧	٢٤.٠
٢٥ % inorganic+٢٥ % compost *B. circulanse*	٨.٣	٨.٦	٢١.٠	٢٤.٠	٦.٩	٧.٧	٣٣٠	٣٢١	٤.٣٣	٤.٢٢	٨٧.٥	٨٨.٦	٢٣.٥	٢٣.٧
٢٥ % inorganic+٢٥ % compost *A. vinelandii*	٨.٨	٩.١	٢١.٠	٢٥.٠	٧.٠	٨.٢	٣٣٥	٣٢٧	٤.٣٦	٤.٣٠	٨٨.٣	٨٨.٨	٢٣.٦	٢٣.٨
New L.S.D at ٥ %	٠.٢	٠.٢	NS	٢.٠	٠.٣	٠.٤	١١.٠	١١.٣	٠.٠٣	٠.٠٣	١.٩	١.٨	٠.٢	٠.٢

Application of plant compost enriched with some microorganisms

The positive action of organic and biofertilization on growth, vine nutritional status, berry setting % and cluster weight surely reflected on improving the yield.

These results are in concordance with those obtained by Madian (٢٠١٠), Uwakiem (٢٠١١) and Ahmed *et al.*, (٢٠١٢a).

٥- Some physical and chemical characteristics of the berries:-

Data in Table (٦ & ٧) show that application of N through ٢٥ to ٧٥ % inorganic form plus ٢٥ to ٧٥ % plant compost enriched with any of the seven biofertilizers significantly improved quality of the berries. The treatment increased berry weight, red coloured berries %, total soluble solids %, total sugars %, T.S.S/ acid and reducing total acidity % in comparison to using N completely via inorganic form (١٠٠ % mineral N). The promotion was associated with reducing inorganic N from ١٠٠ to ٢٥ %. At the same time increasing percentages of enriched composts from ٠.٠ to ٧٥ %. Using EM followed by *Azotobacter vinelandii* with compost achieved the best effect on coloured berries. Percentages of quality of the berries was significantly increased from ٦٧ % in the vines treated completely with inorganic N. At the same time quality of the vines treated with N as ٢٥ % inorganic + ٧٥ % compost enriched with EM was improved by ٩٢ % in the first season of study and from ٥٧.٦ % to ٩٣.٠ % in the second one. The best results with regard to quality of the berries were recorded with supplying the vines with their requirements from N via ٢٥ % inorganic form + ٧٥ % plant compost enriched with EM. Unfaourable effects on fruit quality were observed with using N completely via inorganic form. These results were similar during both seasons.

The effect of organic and biofertilization on enhancing uptake of all nutrients particularly N, Mg and micronutrients surely reflected on enhancing the biosynthesis of plant pigments and total carbohydrates consequently advancing fruit maturity (Dahama, ١٩٩٩ and Kannaiyan, ٢٠٠٢).

These results are in harmony with obtained by Madian (٢٠١٠), Abada *et al.*, (٢٠١٠) and Ahmed *et al.*, (٢٠١٢).

٦- Nitrite in the juice:

Data in Table (٧) show that all treatments comprised from the application of N through inorganic and enriched composts significantly had a reduction effect on nitrite content in the juice in comparison to the vines that fertilized with N through inorganic form only. The reduction on nitrite in the juice was associated with reducing inorganic form of N and increasing the percentages of plant compost enriched with the different microorganisms. The types of microorganism applied with compost that responsible for producing the minimum values was EM, followed by *Azotobacter vinelandii*. The maximum values were presented on the vines that received N completely via inorganic form. Similar results were obtained during both seasons.

These results might be attributed to reduction in mineral N uptake due to using organic and biofertilizers as a replacement of inorganic source.

These results are in harmony with those obtained by Abada *et al*., (٢٠١٠) and Ahmed *et al*., (٢٠١٢b).

٧- Values of dehydrogenase activity, total counts of bacteria and the amount of $CO_{٢}$ in the soil:

Data in Table (٧) clearly show that dehydrogenase activity, total counts of bacteria and the amount of $CO_{٢}$ in the soil significantly were enhanced in response to application of N through mineral N plus plant compost in comparison to application of N completely via inorganic form. The promotion on such soil characters was significantly associated with reducing inorganic N % and increasing plant compost %. Enriching plant compost with *actinomyces*, *Bacillus polymyxa, Spirulina plantensis, Bacillus circulanse, Azospirillum sp, Azotobacter vinelandii* and EM, in ascending order was very effective in enhancing such characters. The maximum values were recorded in the soil that treated with N via ٢٥ % inorganic + ٧٥ % plant compost enriched with EM. Amending the soil with N completely via inorganic N form gave the lowest values. These results were similar during both seasons.

Table ٧: Effect of inorganic N and compost enriched with different microorganisms on some chemical characteristics of the grapes and dehydrogenase activity, total counts of bacteria, CO٢ and nitrite in the soil of Crimson seedless grapevines during ٢٠١١ and ٢٠١٢ seasons.

Treatment	Total sugars %		Total acidity %		T.S.S/ acid		Nitrite (ppm)		Dehydrogenase activity TPF (µg/ dwt g soil/ ١ hr)		Total counts of bacteria(١ g soil/ ١ hr)		CO$_{٢}$ (mg/ ١٠ g dry soil)	
	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢	٢٠١١	٢٠١٢
١٠٠ % inorganic fertilizer	١٦.١	١٦.٣	٠.٧١١	٠.٧٢٠	٢٥.٣	٢٥.٣	١.٨٠	١.٧٣	٠.٠٠٩	٠.٠٢٠	$٦.٧^{٦}$	$٧.١^{٦}$	١١.١	١١.٤
٧٥ % inorganic+٢٥ % compost *B. polymyxa*	١٦.٦	١٦.٩	٠.٦٧١	٠.٦٨٠	٢٧.٦	٢٧.٦	١.٧١	١.٦٣	٠.٠٦٩	٠.٠٨٠	$٧.٢^{٦}$	$٧.٣^{٦}$	١٣.٠	١٤.٣
٧٥ % inorganic+٢٥ % compost *actinomyces*	١٦.٣	١٦.٥	٠.٦٩٤	٠.٦٩٩	٢٦.٢	٢٦.٥	١.٧٦	١.٦٩	٠.٠٣٩	٠.٠٥٠	$٧.١^{٦}$	$٧.٢^{٦}$	١١.٩	١٣.٣
٧٥ % inorganic+٢٥ % compost *S. plantensis*	١٦.٩	١٧.١	٠.٦٥٠	٠.٦٥٩	٢٩.٥	٢٩.٦	١.٦٧	١.٦٠	٠.٠٨٩	٠.١٠٠	$٧.٣^{٦}$	$٧.٥^{٦}$	١٤.٠	١٥.٣
٧٥ % inorganic+٢٥ % compost EM	١٧.٦	١٧.٨	٠.٦٠٠	٠.٦١٠	٣٤.٢	٣٣.٩	١.١١	١.٠٣	٠.١٧٠	٠.١٨٠	$٧.٨^{٦}$	$٧.٩^{٦}$	٢٠.٠	٢١.٣
٧٥ % inorganic+٢٥ % compost *Azopspirillum*	١٧.١	١٧.٣	٠.٦١٠	٠.٦٢٠	٣٢.٨	٣٢.٧	١.٥٥	١.٤٨	٠.١٢٠	٠.١٣١	$٧.٤^{٦}$	$٧.٦^{٦}$	١٦.٢	١٧.٥
٧٥ % inorganic+٢٥ % compost *B. circulanse*	١٧.٠	١٧.٣	٠.٦٢٠	٠.٦٣٠	٣١.٥	٣١.٤	١.٦٠	١.٥٣	٠.١٠٠	٠.١١١	$٧.٤^{٦}$	$٧.٥^{٦}$	١٥.١	١٦.٤
٧٥ % inorganic+٢٥ % compost *A. vinelandii*	١٧.٣	١٧.٥	٠.٦٠٥	٠.٦١٥	٣٣.٤	٣٣.٣	١.٤١	١.٣٤	٠.١٥٠	٠.١٦١	$٧.٥^{٦}$	$٧.٦^{٦}$	١٨.٠	١٩.٣
٥٠ % inorganic+٢٥ % compost *B. polymyxa*	١٨.٢	١٨.٥	٠.٥٩١	٠.٦٠٠	٣٥.٥	٣٥.٥	٠.٩٧	٠.٩٠	٠.٢٢٠	٠.٢٣١	$٨.١^{٦}$	$٨.٣^{٦}$	٢٣.٠	٢٤.٣
٥٠ % inorganic+٢٥ % compost *actinomyces*	١٨.٠	١٨.٢	٠.٥٩٥	٠.٦٠٥	٣٥.٠	٣٤.٧	١.٠٠	٠.٩٧	٠.١٩٠	٠.١٩٩	$٨.٠^{٦}$	$٨.١^{٦}$	٢١.٩	٢٣.٧
٥٠ % inorganic+٢٥ % compost *S. plantensis*	١٨.٥	١٨.٧	٠.٥٨٨	٠.٦٩٧	٣٦.٢	٣٠.٨	٠.٩٠	٠.٨٤	٠.٢٥٥	٠.٢٦٥	$٨.٢^{٦}$	$٨.٣^{٦}$	٢٤.٩	٢٦.٣
٥٠ % inorganic+٢٥ % compost EM	١٩.٥	١٩.٧	٠.٥٧٠	٠.٥٧٩	٣٩.٥	٣٩.٤	٠.٤٥	٠.٣٧	٠.٣٨٠	٠.٣٩١	$٩.٠^{٦}$	$٩.١^{٦}$	٣٣.٠	٣٤.٤
٥٠ % inorganic+٢٥ % compost *Azopspirillum*	١٩.٠	١٩.٤	٠.٥٨٠	٠.٥٩٠	٣٧.٤	٣٧.٣	٠.٧٠	٠.٦٣	٠.٣١٠	٠.٣٢٢	$٨.٤^{٦}$	$٨.٥^{٦}$	٢٨.٠	٣٠.٣
٥٠ % inorganic+٢٥ % compost *B. circulanse*	١٨.٧	١٩.٠	٠.٥٨٥	٠.٥٩٥	٣٦.٨	٣٨.٣	٠.٨٠	٠.٧٣	٠.٢٨٥	٠.٢٩٥	$٨.٣^{٦}$	$٨.٤^{٦}$	٢٧.٠	٢٨.٤
٥٠ % inorganic+٢٥ % compost *A. vinelandii*	١٩.٢	١٩.٥	٠.٥٧٧	٠.٥٨٦	٣٨.١	٣٨.١	٠.٥٥	٠.٤٧	٠.٣٣٠	٠.٣٤٠	$٨.٥^{٦}$	$٨.٣^{٦}$	٣١.٠	٣٢.٤
٢٥ % inorganic+٢٥ % compost *B. polymyxa*	٢٠.٢	٢٠.٥	٠.٥٦٠	٠.٥٧٠	٤١.١	٤٠.٩	٠.٣٥	٠.٢٧	٠.٤٤٠	٠.٤٥٠	$٩.٦^{٦}$	$٩.٨^{٦}$	٣٨.٠	٣٩.١
٢٥ % inorganic+٢٥ % compost *actinomyces*	٢٠.٠	٢٠.٢	٠.٥٦١	٠.٥٧٠	٤٠.٥	٤٠.٤	٠.٤٠	٠.٣٧	٠.٤١٠	٠.٤٢٠	$٩.٤^{٦}$	$٩.٣^{٦}$	٣٦.٠	٣٧.٣
٢٥ % inorganic+٢٥ % compost *S. plantensis*	٢٠.٥	٢٠.٧	٠.٥٥٦	٠.٥٦٥	٤١.٧	٤١.٦	٠.٣٠	٠.٢٣	٠.٤٨١	٠.٤٩١	$١٠.٠^{٦}$	$١٠.٠^{٦}$	٣٩.٠	٤٠.٣
٢٥ % inorganic+٢٥ % compost EM	٢١.٩	٢٢.١	٠.٥١٠	٠.٥٢٠	٤٧.١	٤٦.٥	٠.١٨	٠.١١	٠.٥٨١	٠.٥٩٠	$١٠.٨^{٦}$	$١٠.٩^{٦}$	٤٩.٠	٥٠.٠
٢٥ % inorganic+٢٥ % compost *Azopspirillum*	٢١.٠	٢١.٣	٠.٥٤٥	٠.٥٥٥	٤٣.٥	٤٣.٢	٠.٢٥	٠.١٧	٠.٥٣٠	٠.٥٤٠	$١٠.٣^{٦}$	$١٠.٤^{٦}$	٤٤.٠	٤٥.٣
٢٥ % inorganic+٢٥ % compost *B. circulanse*	٢٠.٨	٢١.٠	٠.٥٥٠	٠.٥٦٠	٤٢.٧	٤٢.٣	٠.٢٨	٠.٢٠	٠.٥٠٠	٠.٥١٠	$١٠.٢^{٦}$	$١٠.٢^{٦}$	٤١.٠	٤٢.٩
٢٥ % inorganic+٢٥ % compost *A. vinelandii*	٢١.٢	٢١.٧	٠.٥٤٠	٠.٥٥٠	٤٣.٧	٤٣.٣	٠.٢٢	٠.١٥	٠.٥٥٠	٠.٥٦٠	$١٠.٦^{٦}$	$١٠.٦^{٦}$	٤٦.٠	٤٧.٤
New L.S.D at ٥ %	٠.٢	٠.٢	٠.٠١٥	٠.٠١٧	٠.٦	٠.٥	٠.٠٣	٠.٠٣	٠.٠٢١	٠.٠٢٩	--	--	١.٠	١.٠

This results might be attributed to the positive action of organic and biofertilization in enhancing microflora activity and making soil pH favourable for such microorganisms (Dahama, ١٩٩٩ and Kannaiyan, ٢٠٠٢).

These results are in harmony with those obtained by Ahmed *et al.*, (٢٠١٢a) and (٢٠١٢b).

As a conclusion, it is advises to supply Crimson seedless grapevines with N via ٥٠ % inorganic N plus ٥٠ % plant compost enriched with EM for improving productivity as well as alleviating the uneven colouration of clusters and juice pollution.

REFERENCES

Abada, M.A.M.; Ibrahim- Asmaa, A. and Bondok- Sawsan, A. (٢٠١٠): How to reduce problems of soil and irrigation water salinity in Superior vineyards? Minufiya. Agric. Res. Vol. ٣٥ No.٤ (٢): ١٩٧٧- ١٤٩٧.

Abd El- Aziz, Y. Z. (٢٠١١): Response of Thompson seedless grapevines to application of organic fertilizer humic acid and some bio fertilizers. Ph. D. Thesis Fac. of Agric. Minia Univ. Egypt.

Abd El- Hameed, H.M., Abada , M.A. and Seleem- Basma, M. (٢٠١٠): Reducing inorganic N fertilizer partially by using yeast, seaweed and farmyard manure extracts in Flame seedless Minia ٢nd Conf .Agric. Environ. Sci. pp ٨١ – ٨٩.

Abd El-Malek, Y. and Ishac, Y. Z. (١٩٦٨): Evaluation of methods used in counting Azotobacter. J. Apple. Bat. ٣١: ٢٦٩ – ٢٧٥.

Ahmed, F. F and Morsy, M. H. (١٩٩٩): A new method for measuring leaf area in different fruit species. Minia. J. of Agric .Rec. & Dev.١٩: ٩٧ – ١٠٥.

Ahmed, F. F.; Abd El- aal, A. M. K. and Masoud, A. A. B. (٢٠١٢a): Attempts for reducing nitrite pollution on Ruby seedless grape by using some organic manures enriched with E.M. Minufiya J. of Agric Res. Vol. ٣٧ No. ٣: ٦١١ – ٦١٩.

Ahmed, F. F.; Mohamed, M. A.; Ragab, M. A.; Merwad, E. A. M. and Mekawy, A. Y. (٢٠١٢b): Improving productivity of Thompson seedless grapevines by application of some vitamins, Humic acid and farmyard manure extract. Minia of Agric. Res. & Develop. Vol. (٣٢) No. ٣ pp ١٣١ – ١٤٥.

Association of Official Agricultural Chemists (١٩٩٥): Official Methods of Analysis ١٤th Ed., A.O.A.C., Washington, D.C. U.S.A. pp. ٤٩٠ – ٥١٠.

Balo, E.; Prilesszky, G.; Happ, I.; Kaholami, M. and Vega. L. (١٩٨٨): Soil improvement and the use of leaf analysis for forecasting nutrient requirements of grapes. Potash Review (Subject ٩, ٢nd suite, No. ٦١: ١-٥).

Casida, L. E.; Klein, D. A. and Santoro, T. (١٩٦٤): Soil dehydrogenase activity soil. Sci. ٩٨, ٣٧١ – ٣٧٦.

Chapman, H. D. and Pratt, P. P. (١٩٦٥): Methods of Analysis for Soils, Plants and Water. Univ. of California. Division of Agric., Sci. ١٧٢ – ١٧٣.

Cochran, W. G. (١٩٥٠): Estimation of bacterial densities by means of the "most probable Number" Biometrics ٦: ١٠٥-١١٦.

Dahama, A. K. (١٩٩٩): Organic farming for sustainable Agriculture. Agro Botanic, Daryagum, New Delhi, India, p. ٢٥٨.

Eman, A. E.; Saleh, M. S. and Mostafa, E. A. M. (٢٠٠٨): Minimizing the quantity of mineral nitrogen fertilizers on grapevine by using humic acid, organic and biofertilizers. Res. J. of Agric. and bio. Sci. ٤: ١, ٤٦ – ٥٠.

Fadl, M. S and Seri El- Deen, S. A. (١٩٧٨): Effect of N Benzyl adenine on photosynthesis pigments total sugars on olive seedling growth under saline condition, Res. Bull. No. ٨٤٣, Fac. Agric. Ain shams Univ.

Jackson, D. (١٩٨٨): Poor fruit set in vines. The significance of early bunch- stem necrosis. Australian & New Zealand Vine

Industry J. ٣ (٢): ٤٢-٤٣.(En, ٢ ref., ١ col. Pa.) Dept. of Hort. Lincoln College, Canterbury, New Zealand.

Kannaiyan, S. (٢٠٠٢): Biotechnology of Biofertilizers Alpha Sci. Inter. ltd. P.O. Box ٤٠٦ Pang Boorne R. ٦٨ M.K. pp ١-٢٧٥.

Lane, J. H. and Eynon, L. (١٩٦٥): Determination of reducing sugars by means of Fehling's solution with methylene blue as indicator A.O.AC. Washington D.C.U.S.A. pp. ١٠٠-١١٠.

Madian, A.M. (٢٠١٠): Adjusting the best source and proportion of mineral, organic and bionitrogen fertilizers on Red Roomy grapevines. Ph. D. Thesis Fac. of Agric. Minia Univ., Egypt.

Mead, R.; Currow, R. N. and Harted, A. M. (١٩٩٣): Statistical Methods in Agriculture and Experimental Biology. Second Ed. Chapman & Hall London. pp ١٠ - ٤٤.

Passingham, J. V. (٢٠٠٤): On the growing of grapevines in tropics. Acta. Horticulture: VII International Stmposium on Temperate Zone Fruits in the Tropics and Subtropics (٦٥: ٣٩ – ٤٤).

Paul, E. A. and Clark, F. E. (١٩٩٦): Soil Microbiology and Biochemistry. ٢nd Ed Academic Press, San Diego p ١ – ٢٥٦.

Ridnour- Lisa, A.; Sim- Julia, E.; Michael, A. H.; David, A. W.; Sean, M. M.; Garry, R. P. and Douglas, R. S. (٢٠٠٠): A spectrophometric method for the direct and quantitation of Nitric oxide, Nitrite and Nitrate in cell culture Media. Analytical Biochemistry, ٢٨١, ٢٢٣ – ٢٢٩.

Seleem- Basma, M. and Telep, A.M. (٢٠٠٨): Effect of organic and biofertilizers as a partial substitute for inorganic nitrogen in Superior grapevines. Minia J. of Agric. Res. & Develop. Vol. (٢٨) No. ١ pp. ٢٣ – ٣٥.

Uwakiem, M. Kh. (٢٠١١): Effect of some organic, bio and slow release N fertilizers as well as some antioxidants on vegetative growth, yield and berries quality of Thompson seedless grapevines Ph. D, Thesis. Fac. of Agric. Minia Univ. Egypt.

Weaver, R. J. (١٩٧٦): Grape Growing. A Wiley Interscience Publication John Wiley & Davis, New York, London, Sydney, Tronto pp. ١٦٠ – ١٧٥.

استخدام كمبوست النبات الملقح ببعض الكائنات الحية الدقيقة كبديل جزئي للأسمدة النيتروجينية المعدنية في كروم العنب الكريمسون سيدلس

محمود رياض جاد الكريم - محمد أحمد حسين
فيصل فاضل أحمد - علاء الدين محمد مدين
قسم البساتين – كلية الزراعة – جامعة سوهاج – سوهاج – مصر .
قسم البساتين – كلية الزراعة – جامعة المنيا – المنيا – مصر .

تم تسميد كرمات العنب الكريمسون سيدلس بكمية النيتروجين المناسبة له (٨٠ جرام/ السنة) إما بالكامل فى الصورة الغير عضوية أو بنسبة ٢٥ إلى ٧٥ % نيتروجين غير عضوي جنباً على جنب مع كمبوست النبات الملقح بأحد السلالات الميكروبية الآتية: باسليس بوليمكسا – الأكتينوميسيس ، الأسبيرولينا بلانتنسيس والكائنات الحية الدقيقة الفعالة والازوسبيرليم ، الباسليس سيركيولانس والأزوتوباكتر فلنديناى وذلك خلال موسمي ٢٠١١ ، ٢٠١٢

تركزت الدراسة على اختبار تأثير معاملات النيتروجين هذه على النمو ، الحالة الغذائية للكرمات والإثمار فى هذه الكرمات.

أشارت نتائج الدراسة إلى أن تقليل النسبة المئوية المستخدمة من النيتروجين الغير عضوي من ١٠٠ إلى ٥٠ % من الكمية الموصى بها من النيتروجين وفى نفس الوقت زيادة النسبة المئوية المستخدمة من كمبوست النبات المزود ببعض الكائنات الحية الدقيقة يؤدى إلى تحسين تدريجي فى صفات طول النمو الرئيسي ومساحة الورقة ومحتوى الورقة

من النيتروجين والنسبة المئوية لعقد الحبات وكمية المحصول ووزن العنقود والحبة ، والنسبة المئوية للثمار ذات اللون الأحمر. أما محتوى الورقة من الفوسفور والبوتاسيوم والماغنيسيوم والصبغات النباتية والنسبة المئوية للمواد الصلبة الذائبة الكلية والسكريات والنسبة ما بين المواد الصلبة الذائبة الكلية إلى الحموضة ونشاط إنزيم الديهيدروجينيز وكمية غاز ك أ$_٢$ المنبعثة والعدد الكلى لبكتريا فى التربة فقد كان يميل إلى الزيادة بتقليل النسبة المئوية المستخدمة من النيتروجين الغير عضوي من ١٠٠ إلى ٢٥ % وفى نفس الوقت زيادة النسبة المئوية المستخدمة من الكمبوست المزود بالكائنات الحية الدقيقة من صفر إلى ٧٥ % وكان تلقيح كمبوست النبات بالأكتينوميسيس ، الباسليس بوليمكسا ، الأسبيرولينا بلانتسيس ، الباسليس سيركيولانس والازوسبيرليم والأزوتوباكتر فلندياى والكائنات الحية الدقيقة الفعالة مرتبة ترتيباً تنازلياً فعالاً جداً فى هذا الصدد.

كانت هناك تأثيرات سلبية على الإثمار فى الكرمات عند استخدام الصورة الغير عضوية للنيتروجين بنسبة مئوية تقل عن ٥٠ %.

يقترح تسميد كرمات العنب الكريمسون سيدلس بالنيتروجين بمعدل ٨٠ جرام للكرمة في السنة في صورة ٥٠ % نيتروجين غير عضوي جنباً إلى جنب مع استخدام كمبوست النبات المزود بالكائنات الدقيقة الحية الفعالة (EM) وذلك لأجل تحسين المحصول كماً ونوعاً وفى نفس الوقت الحد من مشكلة عدم تجانس تلوين العناقيد وكذلك تلوث الحبات بالنيتريت.