Minufiya J.Agric.Res.Vol.35 No. 4(2):1477-1497(2010)"http://agri.menofia.edu.eg/megla.html"

HOW TO REDUCE PROBLEMS OF SOIL AND IRRIGATION WATER SALINITY IN SUPERIOR VINEYARDS?

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(Received: Mar. 29, 2010)

ABSTRACT: ***Ten antisalinity agents namely sulphur, Dynamic K, green manure, yeast, EM, Biogen, humic acid, compost, filter mud and farmyard manure were tested for their effect on counteracting the adverse effects of soil and water salinity on growth, vine nutritional status and fruiting of Superior grapevines growing under sandy saline soil during 2007, 2008 and 2009 seasons.***

All antisalinity agents were very effective in stimulating growth characters namely leaf area, and main shoot length as well as leaf content of N,P,K,Mg,S,Fe,Zn,Mn, berry setting %, yield as well as physical and chemical characters of the grapes. The most pronounced effect on these characters was attributed to using sulphur , Dynamic K, green manure , yeast, EM, Biogen , humic acid , Compost , filter mud and farmyard manure, in descending order.

Treating Superior grapevines growing under saline sandy soil conditions and irrigated with saline water with sulphur at 0.5 kg per vine per and Dynamic K at 5 cm/ vine was accompanied with alleviating the adverse effects of soil and water salinity on fruiting. The present results also emphasized the beneficial of green manure on reducing the impaired effects of soil and water salinity on productivity of Superior grapevines as well as the necessary for using the studied antisalinity agents on Superior grapevines grown under sandy saline soil.

Key Words : ***salinity, grapes, humic acid, sulphur, yeast and biogen .***

INTRODUCTION

Superior grapevine cv is a prime and popular grape cv. successfully grown under Egyptian conditions. It ripens early in the last week of May. In addition, it has a great potentiality for export to foreign markets due to its early ripening characters. Reducing shot berries % in such grape cv is considered an important target for pomologists and exporters.

It was evidence in the last three "decades that the reclamation and improvement of new lands in Egypt is an absolute must to face the ever increasing demands of the growing population. The majority of the new lands in Egypt was sandy saline soils.

Saline soils are characterized by having high amounts of soluble salts. The development of salinity in soils is due to salt accumulation. The most important cations and anions present in such soils are, Na^+, Ca^{++}, SO_4^-, Cl^-, and HCO_3^-. Sodium ions are among the predominate exchangeable bases. In

general, saline soil is designated by electrical conductivity above 4 mmhos/ cm at 25C°, amount of exchangeable sodium not more than 15% of the total exchangeable cations and pH value not more than 8 (Mengel , 1984).

Guidelines of interpretations of quality of water for irrigation, indicated that there was no problem when EC of irrigation water was <0.75 mmhos/cm, the problem always initiates when EC value reached about 0.75- 3.5 mmhos /cm and severe problems took place when EC value was >3.5 mmhos /cm (Browne, 1994).

The main problems of the sandy saline soils are their poor structure and consequently their low available water capacity. Other limitations are the low fertility and the higher salts contents (Sinclair and Hoffmann, 2003) .

The reclamation of these soils in Egypt was mainly dependent upon the addition of natural amendments such as organic materials in different forms, bio fertilizers sulphur, potassium and intercropping (Mengel, 1984).

So, many investigators have paid their attention to these natural conditioners, as a field of research and practical application.

Bio fertilization for fruit crops has called the attention of research workers particularly grapevine growers and it has become in the last few decades a positive alternative to chemical fertilizers. Bio fertilizers are very safe for human, animal and environment since they reduce at the lower extent the great pollution happened in our environment.

Application of bio fertilizers achieved the following benefits:- (Kannaiyan, 2002).

1-Reducing plant requirements of nitrogen by 25%.

2- Improving the availability of various nutrients for plant absorption.

3-Increasing the resistance of plants to root diseases.

4- Reducing the environmental pollution induced by the application of chemical fertilizers.

5- Improving the productivity of the trees.

Humic acid acts as conditioner for the soil and as biocatalyst. It improves soil structure, organic matter, nutrient uptake, root development and microbial activity and it is easily soluble at higher soil pH (Davis and Ghabbour, 1998). Effective microorganisms (E.M) mainly consists of more than 55 microorganisms that can release nutrients from plant residues in the soil and make them available for plants. It is responsible for fixation of N and had higher amounts of nutrients, vitamins B, hormones and antibiotics (Kannaiyan, 2002).

Clean cultivation is greatly achieved by using bio fertilizers especially yeast. Abou-Zaid (1984) reported that yeast contains IAA and cytokinins which effectively promote growth in plants and delays leaf aging. In addition, it contains 93% dry matter, 44.4% protein, 2.19% arginine, 2.09% glycine, 1.07% histidine, 2.14% isolysine, 3.19% lauicine, 3.23% lysine, 0.70% methionine, 0.50% cystine, 1.81 % phenylalanine, 1.49% tyrosine, 2.06% threonine, 0.19% treptophan and 2.32% vitamins B. Also, it contains 7.5 -

8.5% N, 2.6% Fat, 8-9.5%-ash,-6-12%-nucleic acid and 45 -51.5% crude protein. Other constituents of yeast are glutathione, lecithin, enzymes and Co-enzymes. Furthermore, yeast contains vitamin B_1 (thiamin), B_6 (Pyridoxine) and, glycine (Abou Zaid, 1984). Also, it is very beneficial and essential for the synthesis of -aminoleulinic acid (AA) and is necessary for the formation of protoperphyrin, the precursor of chlorophyll 1. It aids in activating photosynthesis process through enhancing the release of carbon dioxide (N.R.P, 1977). The application of yeast to improve growth, vine nutritional status yield as well as physical and chemical properties of various grapevines is getting much importance.

Sulphur is beneficial on decreasing soil pH, soil salinity and increasing protein biosynthesis (Edmond *et al.,* 1975; Nijjar, 1985; Tisdale *et al.,* 1985 and Sohan *et al.,* 1985). The use of sulphur as a fertilizer on vineyards is not common or rare in Egypt. In the past, most NPK fertilizers which are applied in the Egyptian soils contain some amount of this element. Recently, different grapevines begin to suffer from the decline of S in soils. Deficiencies of S have shown a marked increase essentially because of the following five factors (Wild, 1988).

1- The increase in application of sulphur free fertilizers .

2- The reduction in the use of S as an insecticide and fungicide .

3- The decrease in the concentration of S compounds in the atmosphere and rainfall due to the consumption reduction of higher S fuels .

4- The great exhaustion and depletion of S by vines .

5- The readily leaching with irrigation water without compensation by external addition.

Potassium is essential in many plant metabolic processes. While K does not become a part of plant compounds it plays many important regulatory roles in increasing activity of about 60 enzymes, root growth , drought and salinity resistance, translocation of sugars , protein content and self – life of fruits and reducing water loss, wilting and respiration, energy losses, lodging and different disorders and regulating the opening and closing of stomata that is essential for photosynthesis, water and nutrient transport and plant cooling. (Dibb, 1998 and Aksoy *et al.,* 2000).

The positive action of organic fertilizers on fruiting of fruit crops might be attributed to their positive action on improving the biological activity, water holding capacity of the soil, soil fertility, soil organic matter as well as their important roles on reducing soil erosion, the deterioration of the soil structure, soil salinity, and soil ,pH (Fraguas and Silva, 1998)

An abundant source of organic matter is animal manures from intensive animal husbandry facilities. Application of animal manures to agricultural lands has been increasing steadily in recent years for two reasons:

Firstly, manure has been advocated as an alternative nutrient source to synthetic fertilizers, and secondly its application on crop lands provides currently acceptable method for its disoposal (Darwish *et al.,* 1995).

Farmyard manure is a good source of nutrients. It increases number and activity of micro organisms in soil, helps to prevent breakdown of soil structure, leaving good structure in soil associated with greater water holding capacity (Cook, 1986 and Vercesi, 2000).

Green manure is a crop grown to be ploughed in soil. In general, most of all the value of green manure are from the extra nitrogen released when the plant residues are decomposed and this may be related to better structure and on increasing water holding capacity (Garcia- Lujan, 1990)

It is well known that intercropping some field crops with fruit trees as a general practice gives an additional income, improves soil fertility, reduces soil erosion and is very effective in checking menace of weed infestation. Intercropping or growing two or more crops simultaneously on the same field is a farming practice that has received attention from agronomic scientists as means for increasing yield per unit land area. Monoculture of fruit crops is very common. However, research work has also been done on intercropping in fruit crops with respect to the effect of intercropping on yield and fruit quality of main fruit crops (Mengel, 1984 and Cheng and Baumegartner, 2005).

Cover crops are often planted in between vine rows to reduce soil erosion and improve soil fertility and structure. The roots of grapevines and most vineyard cover crops are colonized. Cover crops are colonized by beneficial root fungi known as arbuscular mycorrhizal fungi (AMF). Assuming grapevines and cover crops share AMF species in common, contact among grapevine and cover crop roots may lead to development of a common mycorrhizal network that in turn may facilitate direct nutrient transfer from cover crops to grapevines (Markin, 1989).

Previous studies showed that sulphur (Broyan and Murphy, 1980; Ahmed *et al.,* 1991 , 1993 and 1994 ; Abd El- Hady *et al.,* 2003 and Masoud, 2008), K (Dhillon *et al.,* 1999; Abbas- Enas and Mohamed, 2000; Abd El-aal, 2000 and Abd El-aal and Ahmed, 2001), green manure (Fregoni, 1978; Markin, 1989; Zaffignani, 1990; Garcia- Lujan, 1990, Wunderer, 1992; Wunderer *et al.,* 1992, Aksoy*, et al.,* 2000 ; Abou El- Lail, 2001 and Cheng and Baumegartner , 2005), yeast (Mahmoud, 1996; El- Mougi *et al.,* 1998; Ahmed- Amin Kamilia *et al.,* 2000; El- Sayed 2001a and 2001b; Abd El- Ghany *et al.,* 2001; Abada, 2002, Omran *et al.,* 2003; Abd El- Hameed, 2005; Ibrahim, 2007 and Abd El-Hameed *et al.,* 2010), humic acid (Zachariakis *et al.*, 2001; Saleh *et al.,* 2006 and Abada , 2009), biofertilziers (El- Shamaa and Abd El- Hady , 2001; Planes-leyva *et al.,* 2003; El- Shenawy and Stino 2005a and 2005b, Ibrahim Asmaa, 2005; Mahran , 2005; El- Khafagy, 2006 and Refaai, 2007) and organic fertilizers (Darwish *et al.,* 1995; Kose and Guleryus , 1999; Ragab and Mohamed, 1999; Dahama, 1999; Krajnc, 2000; Vercesi , 2000 ; Ahmed *et al.,* 2000; Ezz- Thanaa, 2000 Corandie 2001 a and 2001b , Kamel 2002 and Ahmed *et al.,* 2003 and 2008) were beneficial in counteracting the adverse effects of salinity on growth , nutritional status and fruiting in different grapevine cvs (

Ahmed and El- Dawwey , 1992; Bravdo, 2000; Ibrahim- Alia, 2002; Nagarajah and Nesbitt, 2002; Stevens and Harvey, 2002; Ahmed and Hassan, 2003; Rofael, 2004 ; Ragab, 2004; Fan *et al.,* 2004; Stevens, 2005 and Mohamed- Ebtesam, 2007).

The objective of this study was studying the effect of some antisalinity agents namely sulphur, potassium, green manure , yeast, EM, Biogen, Humic acid, compost, Filter mud and FYM on fruiting of Superior grapevines. Selecting the best natural amendment for avoiding the adverse effects of salinity on growth and production of such grape cv is considered an another important target.

MATERIALS AND METHODS

This investigation was carried out during three consecutive seasons of 2007, 2008 and 2009 on uniform in vigour own- rooted 99- years old Superior grapevines in a private vineyard located at West Samalout, Minia Governorate where the soil is sandy (Table 1). The selected vines are trained according to cane pruning system (66 eyes for each vines as 6 fruiting canes x 9 eyes + 6 renewal spurs x 2 eyes) using Gable shape supporting system. The vines are planted at 2x 3 meters apart. Irrigation was done by drip system and water salinity reached 1600 ppm while soil salinity was 2000 ppm.

Analysis of the tested soil was done according to the procedures of Jackson (1958); Black *et al.,* (1965) and Wilde *et al.,* (1985) and the data are shown in Table (1):

Table (1): Analysis of the tested soil

Constituents	Values
Sand %	: 79.50
Silt %	: 10.25
Clay %	: 10.25
Texture	Sandy
pH (1: 2.5 extract)	7.71
E.C. (1 : 2.5 extract) (mmhos. 1cm/ 25^{o}C)	3.13
Total $CaCO_3$ %	7.1
O.M. %	0.8
Total N %	0.04
Available P (Olsen method) ppm	3.3
Available K (ammonium acetate) ppm	14.1

The present experiment included the following eleven treatments:

1-Control (unsalinization agents).
2-Using sulphur at 0.5 kg / vine.
3-Using Dynamic K at 5 cm / vine.
4-Green manure (intercropping with Egyptian clover)
5-Yeast at 30 g / vine.

6-E.M (effective microorganisms) at 10 cm/ vine.
7-Biogen at 25 g / vine.
8-Humic acid at 5 cm / vine.
9-Compost at 1.0 kg/ vine.
10-Filter mud at 1.0 kg/ vine.
11-Farmyard manure at 8 kg / vine

Each treatment (eleven treatments) was replicated three times, three vines per each. Nitrogen was added at fixed rate namely 80 g / vine. It was added in ammonium sulphate source (20.6% N) at four unequal batches as 33.3%, 25%, 25% and 16.7% on growth start , first bloom , just after berry setting and at 21 days later, respectively. The three organic fertilizers namely Compost (2%N), Filter mud (2.0 %N) and F.Y.M. (0.25%N) were added once just after carrying out winter pruning (2^{nd} week of Jan in the three seasons.) The six antisalinity agents namely sulphur, Dynamic, yeast, EM, Biogen and humic acid were applied once at growth start. Green manure was established by intercropping Egyptian clover. Clover seeds were sown in the first week of Nov. Plants were blown in the soil.

Other horticultural practices namely 250 kg calcium superphosphate (15.5% P_2O_5) and 200 kg potassium sulphate per fed. as well as irrigation, hoeing and pest management were carried out as usual. Phosphoric fertilizer was added equally twice, the first with F.Y.M. and the second just after berry setting. Potassium fertilizer was applied at two equal batches before first bloom and just after berry setting

Complete randomized block design was followed. The following traits were measured.

1-Growth characters:

Main shoot length (cm) was measured at the middle of May in the three seasons in eight main shoots in all directions of the vines.

Leaf area (cm^2) was estimated in the twenty leaves per vine from those leaves opposite to the first clusters on each shoot (mid. of May) and leaf area (cm^2) was recorded according to the following equation reported by Ahmed and Morsy (1999).

Leaf area (cm^2) - 0.45 (0.79 X W^2) +17.77 where W = the maximum diameter (cm).

2- Leaf Chemical composition:

Petioles were saved, oven dried and grounded then 0.5g weight of each sample was digested using H_2SO_4 and H_2O until clear solution was obtained (A.O.A.C., 1985). The digested solution was quantitatively transferred to 100 ml volumetric flask and completed to 100 ml by distilled water. Thereafter, contents of N, P, K, M, S, Zn, Fe and Mn in the samples were determined according to the methods of Chapman and Pratt (1961) and Wilde *et al.,* (1985).

3- Berry set percentages :

It was calculated just after setting completed by dividing .the number of attached berries in the five caged clusters per vine by the total number of flowers per cluster and multiplying the product by 100.

4- Measurements of yield as well as physical and chemical properties of the berries

Harvesting was conducted in the three seasons at the Mid of June when T.S.S./ acid in the berries of the check treatment reached 24-25 (According to Weaver., 1976). The yield per vine was recorded in terms of weight (kg) and number of clusters per vine. Five clusters were taken at random from the yield of each vine as a composite sample for determination of the following physical and chemical parameters:-

1-Average cluster weight (g.) by using 0.1 sensitivity balance.
2-Average berry weight (g.) by using 0.01 sensitivity balance.
3-Percentage of shot berries was estimated by dividing number of small berries by total number of berries per cluster and multiplying the product X 100.
4-Percentage of total soluble solids in the juice.
5-Percentage of total acidity (expressed as g. of tartaric acid per 100 ml of juice) by titration against 0.1 NaOH using phenolphthalein as an indicator (A.O.A.C, 1985).
6-The ratio between T.S.S and acid.
7-Percentage of total sugars in the juice was determined by using Lane and Eynone volumetric method (A.O.A.C, 1985).

All the obtained data were collected, tabulated and subjected to the proper statistical analysis according to Snedecor and Cochran (1967) using new L.S.D. at 5% test for comparing between means of all the treatments.

RESULTS AND DISCUSSION

1- Leaf area and main shoot length:

Data in Table (2) obviously clear that application of the ten antisalinity agents namely, sulphur, Dynamic K, green manure yeast, EM, Biogen , humic acid, Compost, Filter mud and F.Y.M. significantly were very effective in stimulating the leaf area and main shoot length as compared with unapplication of antisalinity agents. The best five prounced agents in this respect were sulphur, Dynamic K, green manure, yeast and EM, respectively. Using Biogen, humic acid, Compost and filter mud occupied the sixth, seventh, eighth and ninth position in this respect. Farmyard manure occupied the last position. The maximum values were recorded on vines treated with sulphur and Dynamic-K. The lowest values were observed on unterasted vines grown under sandy saline soil. This means that growth of

the vines growing under saline were greatly inhibited without using antisalinity agents. These results are nearly the same in the three seasons.

Table (2): Effect of some antisalinity agents on the leaf area(cm^2), main shoot length (cm) and percentages of N and P in the leaves of Superior grapevines during 2007, 2008 and 2009 seasons.

Treatment	Leaf area (cm^2)			Main shoot length (cm)		
	2007	2008	2009	2007	2008	2009
Control	70.2	71.7	71.9	75.5	76.6	77.0
Sulphur	81.9	84.1	83.3	94.5	93.0	91.7
Dynamic K	80.5	83.0	82.0	92.4	91.6	90.0
Green manure	78.9	81.7	81.6	91.3	90.0	88.5
Yeast	78.0	79.9	80.1	89.1	88.3	87.1
EM	76.9	78.5	79.1	87.3	86.2	85.7
Biogen	75.6	77.2	78.0	85.5	84.1	84.4
Humic acid	74.5	76.0	76.7	84.0	82.8	83.0
Compost	73.5	74.7	75.6	81.3	81.4	81.5
Filter mud	72.4	73.3	74.5	79.4	80.0	80.0
F.Y.M.	71.3	72.0	73.3	77.5	78.6	78.3
New L.S.D. at 5%	1.0	1.0	0.9	1.2	1.3	1.3
	Leaf N %			Leaf P %		
Control	1.92	1.84	1.94	0.17	0.17	0.18
Sulphur	3.00	2.82	2.90	0.41	0.44	0.42
Dynamic K	2.92	2.69	2.81	0.39	0.42	0.40
Green manure	2.82	2.60	2.69	0.37	0.40	0.38
Yeast	2.71	2.51	2.60	0.35	0.36	0.35
EM	2.62	2.40	2.51	0.33	0.33	0.32
Biogen	2.51	2.29	2.40	0.30	0.31	0.30
Humic acid	2.39	2.20	2.30	0.27	0.28	0.28
Compost	2.25	2.11	2.19	0.24	0.25	0.26
Filter mud	2.11	2.01	2.10	0.21	0.22	0.23
F.Y.M.	2.00	1.91	2.02	0.19	0.20	0.21
New L.S.D. at 5%	0.08	0.06	0.06	0.02	0.02	0.02

The adverse effects of salinity on growth characters were supported by the results of Stevens (2005) and Mohamed – Ebtesam (2007).

The enhancing effect of sulphur on growth was emphasized by the results of Abd El- Hady *et al.,* (2003) and Masoud (2008).

The allevating effect of K on the adverse effects of salinity on growth characters was confirmed by the results of Abd El-aal (2000) and Abd El-aal and Ahmed (2001).

The stimulating influence of green manure on growth aspects was reported by Abou El-lail (2001) and Cheng and Boumegartner (2005).

The positive action of yeast on growth traits was assured by the results of Ibrahim (2007) and Abd El- Hameed *et al.,* (2010).

The results regarding the promoting effect of humic acid on growth are in approval with those obtained by Saleh *et al.,* (2006) and Abada (2009).

The effect of bio fertilizers on counteracting the adverse effects of salinity on growth aspects was supported by the results of El- Khafagy (2006) and Refaai (2007).

The beneficial effects of organic fertilizers on growth characters are in harmony with those obtained by Ahmed *et al.,* (2003) and (2008).

2-Leaf content of N, P, K, Mg, S, Zn , Fe and Mn:

Data in Tables (2 & 3 & 4) clearly show that application of the ten previous antisalinity agents significantly was followed by alleviating the impaired effect of salinity on uptake of N,P,K,M,S, Zn , Fe and Mn as compared with non application of these substances. This was appeared in terms of increasing these nutrients in the leaves of treated vines as compared with untreated vines. In descending order, using, sulphur, Dynamic – K, green manure, yeast, EM, Biogen, humic acid. Compost, filter mud and F.Y.M. was very effective in enhancing these nutrients. The promised antisalinity agents in this respect were sulphur, Dynamic-K green manure and yeast.

Table (3): Effect of some antisalinity agents on leaf content of K, Mg , S and Zn of Superior grapevines during 2007, 2008 and 2009 seasons.

Treatment	Leaf K %			Leaf Mg %		
	2007	2008	2009	2007	2008	2009
Control	1.84	1.91	1.81	0.28	0.31	0.31
Sulphur	2.59	2.55	2.45	0.60	0.61	0.64
Dynamic K	2.50	2.50	2.36	0.58	0.58	0.61
Green manure	2.42	2.44	2.31	0.55	0.54	0.57
Yeast	2.35	2.37	2.24	0.51	0.50	0.54
EM	2.27	2.30	2.18	0.48	0.47	0.50
Biogen	2.20	2.22	2.12	0.44	0.44	0.47
Humic acid	2.11	2.16	2.06	0.41	0.41	0.44
Compost	2.04	2.10	2.00	0.38	0.38	0.41
Filter mud	1.97	2.03	1.93	0.34	0.36	0.38
F.Y.M.	1.90	1.97	1.87	0.31	0.33	0.34
New L.S.D. at 5%	0.06	0.05	0.06	0.03	0.02	0.03
	Leaf S %			Leaf content of Zn (ppm)		
Control	0.30	0.27	0.28	30.0	31.0	32.0
Sulphur	0.64	0.61	0.63	48.2	53.6	59.0
Dynamic K	0.60	0.58	0.60	47.1	51.7	56.1
Green manure	0.57	0.55	0.56	46.0	49.6	54.0
Yeast	0.54	0.51	0.52	44.1	47.5	51.9
EM	0.50	0.47	0.49	42.0	45.3	48.2
Biogen	0.47	0.44	0.45	40.0	43.1	46.0
Humic acid	0.43	0.41	0.42	38.0	41.0	43.0
Compost	0.40	0.37	0.38	35.9	38.0	41.0
Filter mud	0.36	0.33	0.35	34.0	36.0	37.5
F.Y.M.	0.33	0.30	0.31	32.2	33.5	35.0
New L.S.D. at 5%	0.03	0.03	0.02	1.8	2.0	2.0

Significant differences on these nutrients were observed among the investigated treatments. The maximum values were detected on the vines treated with sulphur or Dynamic – K. Untreating the vines gave the minimum values. Salinization without using antisalinity agents significantly reduced uptake of most nutrients. These results were true during 2007, 2008 and 2009 seasons.

The results of Rofael (2004) and Ragab (2004) emphasized the reducing effect of salinity on uptake of nutrients by plants.

The positive action of sulphur on uptake of nutrients was reported by Ahmed *et al.,* (1994) and Masoud (2008).

The great stimulation on uptake of elements in sandy soil in response to using K was ensured by the result of Abbas- Enas and Mohamed (2000) and Abd El-aal(2000).

The great uptake of nutrients resulted from using green manure in saline soil was observed by Aksoy *et al.,* (2000) and Abou El-lail(2001).

The profit of yeast in enhancing uptake of element in the grapevines growing under saline soil was assured by the results of El- Sayed (2001a) and Abada (2002).

Abada (2009) confirmed the beneficial effect of using humic acid on enhancing the uptake of elements by the vines.

The results of Mahran (2005); Ibrahim- Asmaa (2006) who worked on biofertilization and Kamel (2002) and Ahmed *et al.,* (2008) who worked on organic fertilization emphasized the improving effects of these fertilizers on vine nutritional status.

3- Berry setting %, yield and cluster weight :

Results in Tables (4 & 5) showed that treating Superior grapevines with antisalinity agents was significantly preferable in improving berry setting % and yield expressed in weight and number of clusters / vine and cluster weight as compared with non application.

Number of clusters per vine in the first season of study did no significantly affect with the present treatments. The promotive effect on berry setting %, yield and cluster weight was attributed to application of sulphur; Dynamic –K, green manure, yeast, EM, Biogen, humic acid, Compost, filter mud and F.Y.M., in descending order. Percentage of berry setting reached 5.2 to 6.1 % in untreated vine while ranged from 6.2 to 15.9 % in the vines treated with antisalinity agents. This means that the reduction on berry setting due to salinization of soil without using antisalinity agents reached 19.0 to 16.0% depending on the means used. The increase on the yield due to application of any antisalinity agents was ranged from 9.0 to 53.0 % in relation to non-application. The best results with regard to the yield were obtained on the vines that treated with sulphur. Under such promised treatment, yield reached 8.4, 10.0 and 10.4 kg/ vine as compared with 6.8, 6.6 and 6.8 kg/ vine produced by untreated vines in the three seasons, respectively. The increase on the yield due to using such agent reached 23.5 , 51.5 and 52.9% over the

check treatment in the three seasons, respectively. These results were true during 2007, 2008 and 2009 seasons.

Table (4): Effect of some antisalinity agents on leaf content of Fe and Mn, berry set % and number of clusters /vine of Superior grapevines during 2007, 2008 and 2009 seasons.

Treatment	Leaf content of Fe(ppm)			Leaf content of Mn (ppm)		
	2007	2008	2009	2007	2008	2009
Control	28.2	29.0	29.9	22.0	23.0	24.0
Sulphur	43.0	43.3	44.5	34.6	36.5	36.1
Dynamic K	41.2	41.7	43.2	33.0	35.0	35.0
Green manure	40.0	40 .5	41.9	31.0	33.9	33.9
Yeast	38.2	39.0	40.5	29.8	32.5	32.7
EM	37.0	37.1	38.9	28.7	31.3	31.5
Biogen	35.3	36.9	37.5	27.5	30.0	29.9
Humic acid	34.0	35.6	36.2	26.2	28.8	28.8
Compost	32.5	34.3	35.0	25.0	27.5	27.5
Filter mud	31.3	33.0	33.1	24.1	26.2	26.2
F.Y.M.	30.2	31.0	31.8	23.0	25.0	25.1
New L.S.D. at 5%	1.1	1.1	1.2	0.9	1.0	1.0
	Berry set %			No. of clusters / vine		
Control	6.0	5.2	6.1	22.0	22.0	22.0
Sulphur	15.9	15.6	13.1	22.0	26.0	27.0
Dynamic K	14.9	14.5	12.5	22.0	26.0	27.0
Green manure	14.0	13.5	11.7	22.0	26.0	27.0
Yeast	13.1	12.5	11.0	21.0	25.0	26.0
EM	12.1	11.4	10.2	21.0	25.0	26.0
Biogen	10.9	10.3	9.6	21.0	25.0	26.0
Humic acid	9.9	9.2	9.0	21.0	24.0	25.0
Compost	9.0	8.2	8.2	21.0	23.0	23.0
Filter mud	7.9	7.2	7.5	21.0	23.0	23.0
F.Y.M.	6.9	6.2	6.7	21.0	23.0	23.0
New L.S.D. at 5%	0.8	1.0	0.6	1.0	1.0	1.0

The great decline on the yield under saline soil conditions was reported by Fan *et al.,* (2004) and Mohamed – Ebtesam (2007).

These results are in close agreement with those obtained by Masoud (2008) who worked on sulphur; Abd El-aal and Ahmed (2001) who worked on K; Abou – El- lail (2001) who worked on green manure, Abd El- Hameed *et al.,* (2010) who worked on yeast; Abada (2009) who worked on humic acid, El-Khafagy (2006) who worked on bio fertilizers and Ahmed *et al.,* (2008) who worked on organic fertilizers.

4- Physical and chemical characters of the berries :

It is evident from the data in Tables (5 & 6) that application of antisalinity agents significantly improved physical and chemical characters of the berries in terms of increasing berry weight, total soluble solid%, total

sugars% and T.S.S./ acid and in reducing shot berries % and total acidity rather than non- application . The promotion on quality of the berries was attributed to using sulphur, Dynamic–K, green manure, yeast, EM, Biogen, humic acid, Compost, Filter mud and F.Y.M., in descending order. Unfavourable effects on fruit quality were observed when the vines grown under saline soil and untreated with such agents. The best results were obtained on the vines grown under saline soil treated with sulphur or dynamic –K. Similar trend was observed in the three seasons.

Table (5): Effect of some antisalinity agents on yield / vine (kg), cluster weight (g.), shot berries % and berry weight (g.) of Superior grapevines during 2007, 2008 and 2009 seasons.

Treatment	Yield/ vine (kg.)			Cluster weight (g.)		
	2007	2008	2009	2007	2008	2009
Control	6.8	6.6	6.8	311.0	300.0	311.0
Sulphur	8.4	10.0	10.4	381.0	384.0	386.0
Dynamic K	8.1	9.6	10.0	366.0	370.0	371.0
Green manure	8.0	9.5	10.0	365.0	366.0	371.0
Yeast	7.6	9.1	9.5	362.0	364.0	367.0
EM	7.4	8.8	9.4	352.0	353.0	360.0
Biogen	7.4	8.8	9.3	351.0	352.0	356.0
Humic acid	7.3	8.1	8.8	347.0	339.0	350.0
Compost	7.3	7.6	8.0	346.0	331.0	348.0
Filter mud	7.0	7.4	7.8	334.0	321.0	337.0
F.Y.M.	6.8	7.2	7.4	322.0	311.0	322.0
New L.S.D. at 5%	0.4	0.5	0.5	11.0	10.0	10.0
	Shot berries %			Berry weight (g.)		
Control	6.5	7.0	7.0	2.81	2.83	2.91
Sulphur	3.6	3.5	3.1	3.36	3.40	3.30
Dynamic K	4.0	4.0	3.7	3.30	3.35	3.25
Green manure	4.4	4.4	4.0	3.25	3.30	3.22
Yeast	4.7	4.7	4.5	3.18	3.22	3.18
EM	5.0	5.0	5.0	3.13	3.16	3.15
Biogen	5.3	5.2	5.4	3.08	3.11	3.12
Humic acid	5.5	5.7	5.7	3.04	3.06	3.09
Compost	5.8	6.0	6.0	2.97	3.00	3.03
Filter mud	6.0	6.5	6.4	2.91	2.94	2.99
F.Y.M.	6.3	6.8	6.7	2.86	2.88	2.95
New L.S.D. at 5%	0.2	0.2	0.2	0.05	0.04	0.03

Table (6): Effect of some antisalinity agents on percentages of total soluble solids ,total acidity and total sugars as well as T.S.S./ acid of Superior grapevines during 2007, 2008 and 2009 seasons.

Treatment	T.S.S. %			Total acidity %		
	2007	2008	2009	2007	2008	2009
Control	18.0	18.1	18.0	0.711	0.704	0.708
Sulphur	20.6	20.6	21.0	0.528	0.502	0.501
Dynamic K	20.3	20.4	20.7	0.550	0.506	0.509
Green manure	20.1	20.2	20.5	0.550	0.520	0.518
Yeast	19.9	20.0	20.1	0.571	0.525	0.555
EM	19.6	19.7	19.8	0.574	0.550	0.570
Biogen	19.4	19.5	19.6	0.595	0.575	0.595
Humic acid	19.1	19.2	19.3	0.615	0.601	0.620
Compost	18.8	18.8	18.8	0.637	0.630	0.645
Filter mud	18.5	18.6	18.5	0.658	0.655	0.665
F.Y.M.	18.3	18.3	18.3	0.680	0.680	0.687
New L.S.D. at 5%	0.3	0.2	0.2	0.021	0.022	0.022
	T.S.S./ acid			Total sugars %		
Control	25.3	25.7	25.4	15.1	15.0	15.0
Sulphur	39.0	41.0	41.9	17.5	17.8	18.4
Dynamic K	36.9	40.3	40.7	17.2	17.5	18.2
Green manure	36.5	38.8	39.6	17.0	17.3	17.8
Yeast	34.9	38.1	36.2	16.9	17.3	17.5
EM	34.1	35.8	34.7	16.6	17.0	17.2
Biogen	32.6	33.9	32.9	16.3	16.6	16.9
Humic acid	31.1	31.9	31.1	16.1	16.3	16.3
Compost	29.5	29.8	29.1	16.0	16.0	16.2
Filter mud	28.1	28.4	27.8	15.7	15.6	15.8
F.Y.M.	26.9	26.9	26.6	15.4	15.3	15.4
New L.S.D. at 5%	0.9	1.0	1.1	0.3	0.3	0.3

The unfavourable effects of salinity on quality of the berries were supported by the results of Rofael (2004) and Ibrahim- Alia (2002).

These results are in concordance with those obtained by Masoud (2008) who worked on sulphur, Abd El-aal (2000) who worked on K, Abou El-lail (2001) who worked on green manure; Abd El- Hameed *et al.,* (2010) who worked on yeast; Abada (2009) who worked on humic acid; Mahran (2005) who worked on biofertilizers and Ahmed *et al.,* (2008) who worked on organic fertilizers.

The benefits of K on alleviating the adverse effects of salinity on growth and fruiting were attributed to its effects in enhancing cell division,

metabolism, enzymes as well as biosynthesis and translocation of organic foods (Nijjar, 1985).

The previous positive action of organic and bio fertilizer agents on counteracting the adverse effects of salinity on growth and fruiting was mainly attributed to their effects on improving soil fertility, fixation of N, uptake of nutrients, natural hormones , vitamins, antioxidants, antibiotics and root development (Nijjar, 1985 and Kannaiyan, 2002).

As a conclusion, it is advised to use antisalinity agents in Superior vineyards grown under sandy saline soil (namely sulphur, Dynamic –K, green manure, yeast, EM and etc.) for counteracting the adverse effects of soil salinity in fruiting of Superior grapevines.

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كيف يمكن تقليل مشاكل ملوحة التربة ومياه الرى فى كروم العنب السوبيريور ؟

محمد على مجاور – أسماء أنور ابراهيم – سوسن عبد الوهاب بندق

قسم بحوث العنب– معهد بحوث البساتين – مركز البحوث الزراعية – الجيزة– مصر

الملخص العربي

تم اختبار تأثير عشرة مواد مضادة لتأثير ملوحة التربة ومياه الرى وهى الكبريت ، ديناميك البوتاسيوم، السماد الأخضر والخميرة والميكروبات الفعالة EM، والبيوجين ، حامض الهيوميك ، الكمبوست، طينة المرشحات، والسماد البلدى فى تقليل الاثار الضارة لملوحة التربة وماء الرى على النمو والحالة الغذائية للكرمة والاثمار فى كرمات العنب السوبيريور النامية فى التربة الرملية الملحية وذلك خلال مواسم ٢٠٠٧ ، ٢٠٠٨ ، ٢٠٠٩م.

كانت جميع المواد المضادة لتأثير للملوحة فعالة جدا فى تحسين صفتى النمو الخضرى وهى مساحة الورقة وطول النمو الرئيسى ومحتوى الورقة من عناصر النيتروجين والفوسفور والبوتاسيوم والماغنسيوم والكبريت والحديد والمنجنيز والنسبة المئوية لعقد الحبات وكمية المحصول وكذلك الخصائص الطبيعية والكيميائية للحبات وكان التأثير واضحا على هذه الصفات عند استخدام الكبريت ، وديناميك البوتاسيوم والسماد الأخضر والخميرة ، EM والبيوجين وحامض الهيوميك والكمبوست وطينة المرشحات والسماد البلدى مرتبة ترتيبا تنازليا.

أن معاملة كرمات العنب السوبيريور النامية تحت ظروف التربة الرملية الملحية والتى تروى بماء مالح ، بالكبريت بمعدل 500 جرام للكرمة ، ديناميك البوتاسيوم بمعدل ٥ سم / الكرمة يكون مصحوبا بتقليل حدة التأثيرات الغير مرغوبة لهذه الملوحة على الاثمار، أكدت نتائج هذه الدراسة كذلك على أهمية التسميد الأخضر فى تقليل الاثار الضارة للملوحة على الاثمار فى كرمات العنب السوبيريور، كذلك ضرورة استخدام هذه المواد المضادة لتأثير الملوحة فى كرمات العنب السوبيريور النامية فى التربة الرملية الملحية.