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EFFECT OF MAGNESIUM AND SOME ANTIOXIDANTS ON GROWTH AND YIELD OF SUGAR BEET AS AFFECTED BY IRRIGATION WATER QUANTITY

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ABSTRACT

Tow field experiments were acrid out El- hamoul, Kafr El-Sheikh governorate in 2014/2015 and 2015/2016 seasons to study the effect of three irrigation water quantity (1500, 2000 and 2500 m³), magnesium and some antioxidants, i.e. 1- control spraying plants of water 2-Spraying plants with Magnesium (Mg) at the concentration of 250 ppm, 3- Spraying plants with ascorbic acid (As)at the concentration of 250 ppm, 4- Spraying plants with salicylic acid (Sa)at the concentration of 250ppm, 5- Spraying plants with mixture of magnesium and ascorbic acid at the concentration of 250ppm, 6- Spraying plants with mixture of magnesium and salicylic acid at the concentration of 250ppm, 7- Spraying plants with Ascorbic and Salicylic acid used were 250 ppm and 8- Spraying plants with mixture of magnesium , ascorbic and salicylic acid at the concentration of 250ppm at 60 and 90 days after sowing. on growth and yield of sugar beet c.v. Hossam. The experiments were laid out in split plot design with three replications.

The obtained results indicated that redused irrigation water amount from 2500 to 1500 m³ / feddan significantly decreased root weight (gm) , total soluble solids % , top yield /fed , root yield /fed ,sugar yield / fed as well as potassium percentage ,on the other hand, raising sucrose percentage and sodium percentage in 2014/2015 and 2015/2016 seasons.

The obtained results indicated that spraying sugar beet plants with solution containing on magnesium plus ascorbic acid and salicylic acid gave the highest values of root weight (gm), total soluble solids, sucrose percentage, top yield per feddan , root yield peer

feddan ,sugar yield per feddan and potassium percentage in root, on the contrary it gave the lowest sodium percentage in root as compared with all other treatments studied in both seasons. On the other hand, the lowest values of all previously mentioned studied traits were recorded with untreated sugar beet plants (control) compared to all other treatments in both seasons. Under the lowest irrigation water quantity (1500m³) spraying sugar beet plants by treatment having mixture of magnesium, ascorbic and salicylic acids significantly increased root weight, total soluble solids; top yield, root yield, sugar yield as well as potassium percentage in both seasons.

Key word: Sugar beet, magnesium, ascorbic acid, salicylic acid, antioxidant, water quantity.

INTRODUCTION

Sugar beet (*Beta vulgaris* L) rank as the second important sugar crop after sugar can in the worlds. In Egypt recently sugar beet was wide cultivated area that sugar can because have the lowest water consumption and short growing season as well as its sowing in the soil have limited quality. Nowadays is the first important step of the Egyptian strategic awes to bridge the gap between yield and sugar consumption is increasing sugar production , such increase is likely to be achieved by increasing unit area production from sugar beet plants . The shortage of irrigation water during growing season represent the main problem limiting the growth and yield of sugar beet crop.

Drought stress significantly restricts plants growth and development. and consequently crop productivity (**Blume, 1996**). **Sayfadeh and Rashidi (2011)** indicated that drought stress causes production of reactive oxygen species (ROSs), which results in greater membrane permeability, i.e. malondialdehyde (MDA) content and oxidative stress in the plants.

Hosseinpour et al. (2006) and Mahmoodi et al. (2008) investigate the yield and quality of sugar beet in relation to different irrigation regimes; 30, 50, 70 and 90% of field capacity (F.C). They found that irrigation treatments had a significant effect on sugar beet yield and quality traits. The highest values of root and sugar yields and quality traits was obtained under 70% of field capacity, while the lowest values was recorded under 90% of field capacity. The average root and sugar yield for the full irrigation treatment were equal to

71.11 and 11.08 Mg ha⁻¹, respectively, while applying 75% and 50% ETc on average caused 9% and 11% yield reduction, respectively **Haghverdi et al. (2017)**.

Recently great effects were done to alleviate the deleterious effect of water deficit and improved growth and yield of sugar beet one of these attempts is applying substances which have increased drought tolerant such as magnesium and antioxidants i.e. salicylic acid and ascorbic acid.

Witold(2001) and **Zengini et al., (2009)** reported that the application as a foliar of 0.5 kg Mg / ha increased the yield of roots by 9.9%, i.e. from 67.37 t. /ha in the control (without magnesium foliar application) to 74.06 t. /ha. The yield of white sugar increased by 9.5%, i.e. from 9.18 t/ha in the control to 10.06 t. /ha. Further significant root and sugar yield increase was due to the double magnesium application, the yield increase was 12.6 and 11.1%, respectively. Technological parameters of sugar beet roots were not significantly affected by the treatments. It could be concluded that the increase in sugar yield resulted from the increased yield of fresh root.

Salicylic Acid (SA) is considered as a hormone like substance which acting an important role in regulating a number of physiological processes such as stomata closure , ion uptake and transport, inhibition of ethylene biosynthesis, transpiration, membrane permeability, photosynthesis and growth (**Abdel-Wahed et al ., 2006 and Ashraf et al ., 2010**) , nitrate metabolism , flowering and stress tolerance (**Hayat et al ., 2007**) . Application of salicylic acid stimulated tolerance in plants to many biotic and abiotic stresses counting fungi, bacteria and viruses , chilling , salinity , drought and heat (**Khan et al ., 2010**). **Abido et al., (2015)** showed that highest growth attributes, yield and its components were resulted from foliar spraying twice the mixture of antioxidants of 150 ppm of each of Ascorbic acid + salicylic acid +citric acid in both seasons . However, spraying with 150 ppm of Ascorbic acid came in the second rank. Highest Total soluble solids (TSS) and sucrose percentage were obtained from foliar spraying twice 150 ppm of citric acid. In addition, highest apparent juice purity percentage were obtained from spraying twice with 150 ppm of salicylic acid in the first season and spraying twice with 150 ppm of Citric acid in the second season.

Reduce environmental pollution and maximum sugar beet growth , yields and its attributes , it could be recommended that

spraying twice with the mixture of antioxidants of 150 ppm of each of Ascorbic acid + salicylic acid + Citric acid and mineral fertilizing with 36 kg k_2O / fed as a top dressing application.

Ascorbic acid is a small water – soluble antioxidant molecule, that acts as a primary substrate in the cyclical pathway for detoxification and neutralization of superoxide radicals and singlet oxygen (**Noctor and Foyer, 1998**). Ascorbic acid is one of the key products of D-glucose salicylic acid metabolism which synthesized in higher plants .it has been shown to play multiple roles in plant growth and development ,i.e. cell division , cell wall expansion (**pignocchi and Foyer, 2003**), electron transport system (**El-kobisy et al., 2005**) and other developmental processes. **Salem et al., (2000)** and **Orabi and Mekki (2008)** found that foliar spraying of sugar beet plants with ascorbic acid (at the rate of 400 ppm) resulted in an increases in all growth characters , yield and quality parameters as compared with untreated plants .

Generally, this investigation was devoted to study the effect of water quantity and magnesium as well as antioxidants treatments on growth and yield of sugar beet plants in 2014/2015 and 2015/2016 seasons at El- hamoul, Kafr El- sheikh governorate condition.

MATERIALS AND METHODS

Tow field experiments were acrid out El- hamoul, Kafr El-sheikh governorate in 2014/2015 and 2015/2016 seasons to study the effect of magnesium and some antioxidant (ascorbic and salicylic acids) on growth and yield of sugar beet c.v. Hossam under different irrigation water quantity.

The Mechanical and chemical analysis of the soil at the experimental site according to standard methods of **Page (1982)** and **Arnold (1986)** in the 2014 / 2015 and 2015 / 2016 seasons are shown in **Table (1)**.

Table 1: Mechanical Chemical analysis of the experimental sites in 2014 / 2015 and 2015 / 2016 seasons.

Analysis	Seasons	
	2014/2015	2015/2016
A- Mechanical analysis:		
Sand %	13.45 %	14.12%
Silt %	22.85%	21.73%
Clay %	63.70%	64.15%
Soil texture	Clay	Clay
B- Chemical analysis:		
PH	6.85	6.93
E.C.	1.21	1.41
Total N%	0.36	0.42
Available P (ppm)	15.03	16.36
Available Zn (ppm)	4.75	4.89
Available K (ppm)	1.51	1.15

1-Irrigation quantity:

Three irrigation water quantity were studied as follows:

- 1- Irrigated plants with 1500 m³/ fed.
- 2- Irrigated plants with 2000 m³/ fed.
- 3-Irrigated plants with 2500 m³/ fed.

The first irrigation at sowing gave was 425 m³/ fed., and the application of irrigation treatments were started at first irrigation after sowing , while the irrigation treatments were applied every 30 days on growth stages for each.

Magnesium and antioxidant treatments:

- 1.Spraying plants with water (control).
- 2.Spraying plants with Magnesium at the concentration of 250 ppm at 60 and 90 days after sowing.
- 3.Spraying plants with ascorbic acid at the concentration of 250ppm at 60 and 90 days after sowing.
- 4.Spraying plants with salicylic acid at the concentration of 250ppm at 60 and 90 days after sowing.
- 5.Spraying plants with mixture of magnesium and ascorbic acid at the concentration of 250ppm for each at 60 and 90 days after sowing.

6. Spraying plants with mixture of magnesium and salicylic acid at the concentration of 250ppm for each at 60 and 90 days after sowing.
7. Spraying plants with Ascorbic and Salicylic acid used were 250 ppm /feddan for each at 60 and 90 days after sowing.
8. Spraying plants with mixture of magnesium, ascorbic and salicylic acid at the concentration of 250 ppm for each at 60 and 90 days after sowing.

The experiments were laid out in split plot design with three replications. The main plots were devoted to irrigation water quantity and sub plots were allocated to magnesium and antioxidant treatments. The area of each sub plot was 21 m² (10 rows x 0.60 m width x 3.5 m long).

On 10 and 15 October, seeds were hand sown in hill 20 cm apart in 2014 / 2015 and 2015 / 2016 seasons, respectively., sugar beet plants were fertilized with super phosphate at the rate of 100 kg / feddan (15.5 % p₂O₅) at soil preparation and nitrogen at the rate of 90 kg / feddan (urea 46%) after thinning plants. All other agronomic practices were followed as usually done for the sugar beet crop.

Characters studied:

At harvest time 10 plants were taken at random from each plot to determine the character was Root weight (g).

At harvest time after 190 days from sowing plants of the six middle rows were harvested to determine the following data:

1. Total soluble solids percentage
2. Root sucrose percentage, it was measured by saccharimeter apparatus according to **Le' Docte (1927)**.
3. Top yield / feddan (ton).
4. Root yield / feddan (ton).
5. Sugar yield / feddan (ton). was estimated by multiplying root yield by sucrose percentage.
6. Root potassium and sodium percentages.

K and Na were measured by flamephotometer according to **Brown and Lilliand (1964)**.

The data were statistically analyzed according to **Gomez and Gomez (1984)**.

RESULTS AND DISCUSSION

Results presented in **Tables 2 to 9** showed clearly that irrigation quantity had the significant effect on root weight (g), total soluble solids percentage, sucrose percentage, top yield per feddan (ton), root yield per feddan (ton), sugar yield per feddan (ton), root potassium percentage and root sodium percentage of sugar beet c.v. Hossam in both 2014/2015 and 2015/2016 seasons.

Irrigation sugar beet plants with the highest water amount 2500 m³/ feddan gave the highest values of root weight 956.00 and 971.00 g, total soluble solids 22.77% and 23.25%, top yield per feddan 6.32 and 7.46 ton, root yield per feddan 30.22 and 30.90 ton, sugar yield per feddan 6.34 and 6.50 ton as well as potassium percentage 3.23 and 3.26 % as compared with other irrigation water quantity used in 2014/2015 and 2015/2016 seasons, respectively. On the other hand, sugar beet plants irrigated with 2500 m³/ feddan gave the lowest values of sucrose percentage 18.91 and 19.10 % as well as sodium percentage 1.68 and 1.61 % as compared with other irrigation water quantity used in 2014/2015 and 2015/2016 seasons, respectively. Irrigated sugar beet plants by 2000 m³ / feddan reduced root as well as sugar yield per feddan by 3.61 and 3.43 ton as well as 0.43 and 0.43 ton, while it was 5.99 and 5.84 ton as well as 0.65 and 0.62 ton when irrigated sugar beet plants by 1500 m³ / feddan compared to those irrigated by 2500 m³ / feddan in 2014/2015 and 2015/2016 seasons, respectively.

The decrease in root and sugar yield per feddan owing to decreasing irrigation water quantity from 2500 to 1500 m³ / feddan may be attributed to the decrease in root weight (g) which decreased root and sugar yields / feddan and sugar yield / feddan.

These results suggested that under shortage of irrigation water quantity can be sowing sugar beet plants and irrigated it with 2000 m³/ feddan to gave the lowest decrease in root and sugar yield per feddan and saving quantity of 500 m³/ feddan from irrigation water during growing season

These results are in harmony with those of **Hosseinpour *et al.* (2006)** and **Mahmoodi *et al.* (2008)**

Results recorded in **Tables 2 to 9** indicated that magnesium and antioxidants significantly affected root weight (g), total soluble solids percentage, top yield per feddan (ton), root yield per feddan (ton),

sugar yield per feddan (ton), potassium percentage in roots and sodium percentage in roots in both seasons. The obtained results indicated that spraying sugar beet plants with solution containing on magnesium plus ascorbic and salicylic acids gave the highest values of root weight 961.00 and 993.00 g , total soluble solids 23.52% and 23.88 % , sucrose percentage 21.34 and 21.66 % , , top yield per feddan 7.38 and 7.52 ton , root yield per feddan 33.65 and 34.78 ton , sugar yield per feddan 7.16 and 7.50 ton , and potassium percentage in roots 3.05 and 3.05 % , On the contrary it gave the lowest sodium percentage in root 1.57 and 1.57% as compared with all other treatments studied in 2014/2015 and 2015/2016 seasons, respectively. On the other hand, the lowest values of all previously mentioned studied traits were recorded with untreated sugar beet plants (control) compared to all other treatments in both seasons. Also, it could be seen that treatments having magnesium with Ascorbic acid or Salicylic acid gave the higher values of most characters after treatment having magnesium with Ascorbic and Salicylic acid in both seasons.

The increase in root and sugar yield per feddan according to treated sugar beet plants with magnesium plus Ascorbic and Salicylic acid might be attributed to the increase in root weight and sucrose percentage which These results are in agreements with those of **Witold (2001)** and **Zengini *et al* (2009)**

Data presented in **Tables 2 to 9** showed clearly that the interaction effect between irrigation water quantity and magnesium with antioxidant treatments was significant on all studied characters in both seasons.

Irrigated sugar beet plants with 2500 m³/feddan and sprayed with treatment content of magnesium plus Ascorbic and Salicylic acid gave the higher values of root weight 1055.00 and 1100.00 g , total soluble solids 24.15 and 24.96%, top yield / feddan 7.98 and 8.19 ton , root yield per feddan 36.95 and 38.15 ton, sugar yield per feddan 7.63 and 7.87 ton as well as potassium percentage in root 3.47 and 3.49 % than all other this interaction treatments in 2014/2015 and 2015/2016 seasons , respectively.

Under the lowest irrigation water quantity (1500 m³) spraying sugar beet plants by treatment having mixture of magnesium , ascorbic and salicylic acids were significantly increased root weight by and % , total soluble solids; top yield, root yield, sugar yield as well as potassium percentage. On the other hand the lower values of

all previously mentioned traits were recorded with sugar beet plants irrigated with 1500m³/ feddan and untreated with magnesium and antioxidant in both seasons.

However, at the lowest irrigation water quantity 1500 or 2000 m³/ feddan treated sugar beet plants by Mg + As + Sa gave the highest values of all studied traits except sucrose % and sodium % its were low as compared to all other treatments .These results are in harmony with those of **Salem *et al.*, (2000)** and **Orabi and Mekki (2008)**.

These results suggested that treated sugar beet plants with magnesium plus ascorbic and salicylic acid might be advocated and alleviated the deleterious effect of water deficit on growth which led to increasing root and sugar yield under lowest quantity of water irrigation.

It could be recommend that treated sugar beet plants with treatment having magnesium, ascorbic and salicylic acid improved growth and raising root and sugar yield under the lowest quantity of water irrigation at El- hamoul, Kafr El- sheikh governorate condition.

Table 2: Average root weight (g) of sugar beet plants as affected by magnesium and some antioxidant treatments under different irrigation water quantity in 2014/2015 and 2015/2016 seasons.

Magnesium and antioxidant treatments (s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m ³ /fed (I)			mean	Irrigation quantity. m ³ /fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	733.00	795.00	871.00	800.00	751.00	828.00	892.00	824.00
Mg	778.00	854.00	962.00	865.00	800.00	865.00	968.00	878.00
As	761.00	824.00	941.00	842.00	774.00	835.00	952.00	854.00
Sa	745.00	792.00	911.00	818.00	764.00	810.00	927.00	833.00
Mg + As	808.00	881.00	971.00	887.00	832.00	894.00	995.00	907.00
Mg +Sa	797.00	864.00	970.00	877.00	812.00	884.00	972.00	890.00
As + Sa	790.00	855.00	968.00	860.00	804.00	870.00	970.00	881.00
Mg +As +Sa	871.00	957.00	1055.0	961.00	900.00	997.00	1100.0	993.00
mean	785.00	853.00	956.00	863.00	804.00	873.00	971.00	882.00

L.S.D at 5% for: I 16.97

S 18.10

I.S 22.75

17.44

20.10

23.95

Magnesium and antioxidants treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	20.95	21.13	21.86	21.31	21.11	21.56	22.12	21.59
Mg	21.23	22.13	22.97	22.11	21.35	22.45	32.21	22.33
As	21.10	21.95	22.31	21.78	21.15	22.36	22.63	22.04
Sa	21.01	21.11	21.78	21.30	21.03	22.78	22.52	21.77
Mg + As	21.58	22.43	23.11	22.37	21.81	22.68	23.73	22.74
Mg +Sa	21.49	22.33	23.00	22.27	21.52	22.48	23.48	22.49
As + Sa	21.30	22.29	22.98	22.19	21.43	22.31	23.35	22.36
Mg +As +Sa	22.65	23.78	24.15	23.52	22.76	23.93	24.96	23.88
mean	21.41	22.14	22.77	22.10	21.52	22.44	23.25	22.40

L.S.D at 5% for: I	0.09	0.08
S	0.10	0.11
LS	0.19	0.18

Magnesium and antioxidant treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	19.00	17.93	17.10	18.01	19.11	18.05	17.21	18.12
Mg	21.11	20.11	19.25	20.15	21.23	20.21	19.33	20.25
As	19.61	18.85	17.93	18.79	19.73	18.96	18.11	18.93
Sa	19.21	18.31	17.28	18.26	19.32	18.71	17.83	18.62
Mg + As	21.65	20.73	20.09	20.82	21.71	21.00	20.30	21.00
Mg +Sa	21.40	20.51	19.63	20.51	21.44	20.53	19.92	20.63
As + Sa	21.30	20.42	19.35	20.35	21.32	20.36	19.51	20.39
Mg +As +Sa	22.17	21.21	20.65	21.34	23.00	21.35	20.63	21.66
mean	20.68	19.75	18.91	19.78	20.85	19.89	19.10	19.95

L.S.D at 5% for: I	0.87	0.93
S	0.93	1.00
LS	1.12	1.17

Table 5: Average top yield / fed (ton) of sugar beet plants as affected by magnesium and some antioxidant treatments under different irrigation water quantity in 2014/2015 and 2015/2016 seasons.

Magnesium and antioxidant treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	5.73	6.17	6.73	6.21	5.86	6.31	6.82	6.33
Mg	6.05	6.58	7.35	6.66	6.21	6.67	7.47	6.78
As	5.96	6.39	7.18	6.51	6.03	6.49	7.36	6.62
Sa	5.81	6.28	6.96	6.35	5.93	6.36	7.11	6.46
Mg + As	6.26	6.78	7.54	6.86	6.47	6.91	7.72	7.03
Mg +Sa	6.18	6.65	7.43	6.75	6.29	6.79	7.55	6.87
As + Sa	6.12	6.61	7.39	6.70	6.23	6.71	7.53	6.82
Mg +As +Sa	6.79	7.37	7.98	7.38	6.89	7.48	8.19	7.52
mean	6.11	6.60	6.32	6.67	6.23	6.71	7.46	6.80
L.S.D at 5% for: I				0.28	0.30			
S				0.35	0.37			
IS				0.54	0.57			

Table (6) Average root yield / fed (ton) of sugar beet plants as affected by magnesium and some antioxidant treatments under different irrigation water quantity in 2014/2015 and 2015/2016 seasons.

Magnesium and antioxidant treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	25.65	27.85	30.50	28.00	26.30	29.00	31.25	28.85
Mg	27.25	29.90	33.70	30.28	28.00	30.30	33.90	30.73
As	26.65	28.85	32.95	29.48	27.10	29.25	33.35	29.90
Sa	26.05	27.75	31.90	28.56	26.75	28.35	32.45	29.18
Mg + As	28.30	30.85	34.00	31.05	29.15	31.30	34.85	31.76
Mg +Sa	27.90	30.25	33.95	30.70	28.45	30.95	34.05	31.15
As + Sa	27.65	29.95	33.90	30.10	28.15	30.45	33.96	30.85
Mg +As +Sa	30.50	33.50	36.95	33.65	31.30	34.90	38.15	34.78
mean	27.49	29.87	33.48	30.22	28.15	30.56	33.99	30.90
L.S.D at 5% for: I				0.95	0.32			
S				1.01	0.35			
IS				1.20	0.54			

Table 7: Average sugar yield / fed (ton) of sugar beet plants as affected by magnesium and some antioxidant treatments under different irrigation water quantity in 2014/2015 and 2015/2016 seasons.

Magnesium and antioxidant treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	4.87	4.99	5.21	5.02	5.02	5.23	5.37	5.21
Mg	5.75	6.01	6.48	6.08	5.94	6.12	6.55	6.20
As	5.22	5.43	5.90	5.51	5.34	5.54	6.03	5.63
Sa	5.00	5.08	5.51	5.19	5.16	5.30	5.78	5.41
Mg + As	6.12	6.39	6.83	6.44	6.32	6.57	7.07	6.65
Mg +Sa	5.97	6.20	6.66	6.27	6.09	6.35	6.78	6.40
As + Sa	5.88	6.11	6.55	6.18	6.00	6.19	6.62	6.27
Mg +As +Sa	6.76	7.10	7.63	7.16	7.19	7.45	7.87	7.50
mean	5.69	5.91	6.34	5.98	5.88	6.09	6.50	6.15

L.S.D at 5% for: I 0.33

0.37

S 0.39

0.42

LS 0.60

0.65

Table 8: Average potassium percentage of sugar beet plants as affected by magnesium and some antioxidant treatments under different irrigation water quantity in 2014/2015 and 2015/2016 seasons.

Magnesium and antioxidant treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	2.23	2.86	3.05	2.71	2.25	2.89	3.09	2.74
Mg	2.35	2.92	3.21	2.82	2.38	2.95	3.26	2.86
As	2.29	2.89	3.16	2.78	2.33	2.91	3.19	2.81
Sa	2.25	2.88	3.10	2.74	2.29	2.90	3.11	2.76
Mg + As	2.43	2.99	3.32	2.91	2.45	3.03	3.37	2.95
Mg +Sa	2.40	2.95	3.29	2.88	2.42	3.00	3.33	2.91
As + Sa	2.38	2.94	3.27	2.86	2.40	2.97	3.30	2.85
Mg +As +Sa	2.61	3.07	3.47	3.05	2.67	2.99	3.49	3.05
Mean	2.36	2.93	3.23	2.84	2.39	2.95	3.26	2.86

L.S.D at 5% for: I 1.10

1.31

S 1.15

1.37

LS 1.75

1.85

Table 9: Average sodium percentage of sugar beet plants as affected by magnesium and some antioxidant treatments under different irrigation water quantity in 2014/2015 and 2015/2016 seasons.

Magnesium and antioxidant Treatments(s)	2014/2015 season				2015/2016 season			
	Irrigation quantity. m3/fed (I)			mean	Irrigation quantity. m3/fed (I)			mean
	1500	2000	2500		1500	2000	2500	
Zero (control)	1.93	1.89	1.83	1.88	1.89	1.82	1.76	1.82
Mg	1.82	1.72	1.69	1.74	1.78	1.67	1.62	1.69
As	1.85	1.77	1.71	1.77	1.79	1.70	1.64	1.71
Sa	1.87	1.80	1.74	1.80	1.83	1.75	1.68	1.75
Mg + As	1.75	1.68	1.62	1.68	1.74	1.62	1.55	1.63
Mg +Sa	1.77	1.70	1.66	1.71	1.76	1.64	1.58	1.66
As + Sa	1.79	1.71	1.68	1.72	1.77	1.65	1.59	1.67
Mg +As +Sa	1.63	1.58	1.51	1.57	1.61	1.58	1.53	1.57
Mean	1.80	1.73	1.68	1.73	1.77	1.67	1.61	1.68
L.S.D at 5% for: I			0.08				0.03	
S			0.15				0.12	
I S			0.33				0.37	

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تأثير المغنسيوم وبعض مضادات الأكسدة على نمو ومحصول بنجر السكر تحت كميات ري مختلفة

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أقيمت تجربتان حقليتان بمنطقة الحامول محافظة كفر الشيخ في موسمي 2015/2014 و 2016/2015م وذلك لدراسة تأثير ثلاث كميات من مياه الري وهي (1500 و 2000 و 2500م³ للفدان) وكذلك تأثير الرش بالمغنسيوم وحمض الأسكوربيك وحمض الساليسليك منفردين أو في مخاليط بعد 60 و 90 يوم من الزراعة بتركيز 250 جزء في المليون على نمو ومحصول بنجر السكر وصممت التجربة في قطع منشقة مره واحده . ويمكن تلخيص النتائج : ري نباتات بنجر السكر بمعدل 1500م³ للفدان لنقص معنوي في وزن الجذر والنسبه المئويه للمواد الصلبه الذائبه الكليه ومحصول العرش ومحصول الجذور ومحصول السكر للفدان وكذلك النسبه المئويه للبوتاسيوم بينما أدى إلي زياده النسبه المئويه للسكروز والصوديوم في كلا موسمي الدراسه . أدى رش نبات بنجر السكر بمخلوط من المغنسيوم وحمض الأسكوربيك وحمض الساليسليك أعطت أعلى القيم لكل من وزن الجذور والنسبه المئويه للمواد الصلبه الذائبه الكليه ومحصول العرش ومحصول الجذور للفدان وكذلك النسبه المئويه للبوتاسيوم بينما أعطت أقل نسبه مئويه للصوديوم . وأدى رش النباتات بالماء (كنترول) لأقل القيم لكل الصفات السابقه في كلا موسمي الدراسه وكان للتفاعل بين معاملات الري والرش بالمغنسيوم وبعض مضادات الأكسدة تأثيرا معنوياً على معظم صفات الدراسه في كلا الموسمين حيث أدى رش النباتات بمخلوط من المغنسيوم وحمض الأسكوربيك وحمض الساليسليك تحت كل مستويات ماء الري المنخفض إلي الحصول علي أعلى القيم لمحصول العرش ومحصول الجذور والسكر للفدان مقارنة بباقي المعاملات تحت نفس مستوى الرطوبه في كلا موسمي الدراسه. تحت مستوى ماء الري المنخفض (1500م³) أدى رش النباتات بمخلوط من المغنسيوم وحمض الأسكوربيك وحمض

السالسليك الى تخفيف التأثير الضار لنقص ماء الري وادى الى زيادة معنوية في محصول الجذور والسكر للفدان مقارنة بالمعاملات الاخرى في كلا الموسمين .

توصى الدرسته بأن ري نبات بنجر السكر بمعدل 2500م³/فدان مع الرش بمخلوط من المغنسيوم وحمض الأسكوربيك وحمض السالسليك أدى إلى زياده معنويه فى المحصول ومكوناته تحت ظروف منطقة الحامول محافظة كفر الشيخ.

لمرض فيروس الورم الحليمي البشري منتشرة بين النساء المرضي من بنغازي . هنالك حاجة إجراء مزيد من الدراسات على عينات أكبر والمقاطع العرضية لتحديد انتشار عدوى فيروس الورم الحليمي البشري المسببة للأمراض في المرأة من بنغازي . العوامل الخطره قد تكون عوامل الخطر المستقلة التي إضافة إلى عامل فيروس الورم الحليمي البشري . وتقدم هذه الدراسة فرصة ممتازة لوجود وانتشار فيروس الورم الحليمي البشري في المرأة الليبية. يوصي بإجراء مزيد من الدراسات من أجل تصميم استراتيجية لمكافحة سرطان وطنية التي لا توجد في ليبيا .
