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EFFECT OF IRRIGATION TREATMENTS, POTASSIUM FERTILIZER AND THEIR INTERACTION ON SUGARCANE UNDER ASWAN GAVERNORATE

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ABESTRACT

A field experiment was carried out at private farm in Aswan Governorate, Egypt during 2013/ 2014 and 2014/2015 seasons to study the effect of number of irrigations, potassium fertilizer levels and their interaction on sugarcane. The experiment included fifteen treatments represent three irrigation (22, 19 and 16 irrigations) and five potassium levels (20, 30, 40, 50 and 60 kg K_2O/fed.). A spilt – plot design with four replications was used in both seasons. Irrigation treatments were allocated in the main plots, while potassium fertilizer levels were randomly distributed in the sub - plots. The experimental unit area was 21 m^2 with 6 ridges of 3.5 meters in length and 1.0 meter apart. The commercial cane variety of G.T.54/9 was planted during the first week of March using dry method in both seasons.

The results revealed millabel cane length, number of millable cane /m^2, diameter of millable cane, millable cane yield(ton/fed.), sugar yield (ton/fed.), total soluble solids, sucrose percentage and sugar recovery percentage were significantly affected by irrigation treatments in both seasons. Twenty-two irrigation produced the highest values for the previous traits. It was found that potassium level of 60 kg K_2O /fed.significantly increased these characters in the two seasons. The interaction effect between irrigation treatments and potassium levels was significant for all studied traits except no. of millable cane /m^2in both seasons. Fertilized sugarcane with 60 kg K_2O /fed. with 22 irrigations produced the highest valuesfor the previous traitsin the two seasons.

The data revealed that irrigation treatments attained a significant effect on purity percentage and reducing sugar percentage in both seasons, the highest purity percentage resulted from 19 irrigations treatment in both seasons. On the other hand,

the highest reducing sugar percentage resulted from16 irrigations treatment. Increasing potassium fertilizer level caused decrease in purity percentage and reducing sugar percentage in both seasons.

In conclusion, cultivation of the commercial sugarcane variety G.T. 54/9 at Aswan Governorate with applying 22 irrigation during the growing seasons and fertilizing sugarcane plants with 60 kg K2O /fed. cleared positive response to improve yields of cane and sugar and maximized production of sugarcane crop.

INTRODUCTION

Sugar cane is a C_4 plant that is able to maintain higher rates of photosynthesis compared to C_3 plants, depending on the availability of water and nutrients (N P K and macro elements). Under conditions of good supply of water and nutrients, sugar cane plants cane express the best characteristics and produce highest yield of cane and sugar, which the main goal of sugar cane cultivation.

Increasing quantities and qualitative characters through irrigation and K fertilizer is considered one of the very important agronomic processes. Mokadem and Tantawy (1999) as well as, Gomaa(2000) showed that increasing irrigation intervals caused a reduction in cane yield/ fed. and significantly decreased sugar yield / fed . Bekheet (2001)found that application more irrigation water attained the highest value of plants /m^2 and stalk height, increased sucrose and sugar recovery%. Raul Am. Bekheet(2006) showed that shortening irrigation intervals from 20 to 12 days significantly increased cane yield/fed .,while applying irrigation water every 12 or 16 days attained significant increase in number of millable cane / fed and sugar yield / fed. Ali(2007) reported that yield and yield components i.e. number millable cane /m^2, length and diameter of millable cane and millable cane and sugar yields /fed., juice quality i.e. T.S.S% sucrose % ,purity%, sugar recovery% and reducing sugar % significantly inflounced by the studied irrigation treatment in both seasons. The values of the mentioned characters were gradually increased as irrigations number increased from 16 to 19 and 22 irrigation. Uribe *et al.* (2013) reported that there was a positive and synergistic effect of irrigation on productivity of stalk and sugar cane yields.

The previous studies on potassium for sugar cane cleared the important role of potassium fertilizer. Vijay-Kumar *et al.* (2000) reported that the high K rates increased cane height. Juice quality parameters and sugar yield were increased with the application of 50 and 75 kg K_20/fed., respectively. Taha *et al*(2003) found that potassium application significantly increased stalk diameter ,millable cane yield and sugar yield / fed. In general, all traits were increased by increasing K levels application compared to the control. Bekheet(2006) showed that increasing the applied K levels from 0.0 up to 75 kg K_20/fed. increased stalk length, sucrose percentage, sugar recovery

percentage, cane yield and sugar yield. Ali (2007) reported that yield and yield components, juice quality traits were significantly affected by potassium fertilizer levels. Increasing K levels increasing gradually the mentioned traits in both seasons. Soomro *et al.* (2014) reported that tillers plant, plant height, stalk girth, millable cane yield, crop growth, brix, pol, purity, commercial cane sugarwere higher with the application of 100% recommended K fertilizer (168 kg potassium sulphate / ha) and 25% more than recommended K fertilizer (210 kg potassium sulphate / ha.). De Costa *et al*. (2016) found that increasing K level improved plants growth. The aim of this investigation study the effect of irrigation treatments, potassium fertilizer and their interaction on sugarcane.

MATERIALS AND METHODS

A field experiment was carried out in private farm at Aswan governorate, Egypt in 2013/2014 and 2014/2015 seasons to study the effect of irrigation treatments, potassium fertilizer and their interaction on sugar cane. Soil texture of the experiment site was silt clay loam, pH 7.5, contained 0.196 and 0.168 %N available P of 17.8 and 18.4 ppm, available K of 64.0 and 71.0 ppm in the first and second seasons, respectively.

Every field trail included 15 treatments represent the combinations of three irrigation treatments (A) and five potassium fertilizer levels (B).

A: Irrigationtreatments (Number of irrigations)

1- Normal irrigation (22 irrigations) as recommended in this area.

2- Skipping 3 irrigations (19 irrigations), during April, July and October

3- Skipping 6 irrigations (16 irrigations), during April, May, June, July, August and September.

B: Potassium fertilization levels:

K_1: 20 kg K_2O/fed.

K_2: 30 kg K_2O/fed.

K_3: 40 kg K_2O/fed.

K_4: 50 kg K_2O/fed.

K_5: 60 kg K_2O/fed.

Potassium fertilizer was applied in the form of potassium sulphate (48-52 % K_2O), with the second nitrogen dose. A split- plotdesign with four replications was used. Irrigation treatments (A) were allocated to the main-plots; meanwhile the potassium fertilizer levels (B) were randomly distributed in the sub-plots.The experimental unit area was 21 m^2 with 6 beds of 3.5 meters in length and 1.0 m. apart. Sugar cane variety G.T. 54-9 (C9) was planted during the first week of march in both seasons, 30 kg P_2O_5/ fed was applied during land preparation as calcium superphosphate (15% P_2O_5) Nitrogen fertilizer was added at rate of 210 kg / fed as urea (46%N) in two equal doses, the first after two months from planting and the second one after one month later. All other agricultural practices were carried out as recommended.

Date recorded:

I-Yield and yield components:

At harvest three guarded ridges of each sub-plot were harvested,

topped and cleaned to estimate the following characteristics:
1-Millable cane length (cm).
2-Number of millable cane /m^2.
3-Diameter of millablecane.(cm).
4-Millable cane yield (tons/fed.).
5-Sugar yield (tons/fed.):it was estimated according to the following equation:
sugar yield (tons/fed.) = Cane yield (tons/fed) ×Sugar recovery %.

II- Juice quality characters:

At harvest, a sample of 20 stalks represents each plot was taken at random, stripped, cleaned and squeezed to determine the following measurements:
1-Total soluble solids (TSS %) in juice: it was determined in the laboratory by using brix hydrometer.
2-Sucrose percentage: it was determined by using Sacharemeter according to A.O.A.C.(1995).
3-Purity percentage: it was calculated according to the following equation:
Purity percentage=Sucrose% / brix% × 100
4-Sugar recovery percentage: it was calculated to follows:
Sugar recovery% =[Sucrose% - 0.4(Brix % - Sucrose%) × 0.73].
5- Reducing sugars percentage: it was determined by fehling solution.
Statistical analysis:

The collected data were subjected to the proper statistical analysis of split plot design according to the procedure outlined by Snedecor and Cochran (1981). For comparison among treatment means, L.S.D.at 5% level of probability was used.

RESULTS AND DISCUSSION

Effect of irrigation treatments, potassium fertilizer and their interactions on yield and yield components:

1- Millable cane length (cm):

The results obtained in Table (1) cleared that millable cane length was significantly affected by studied irrigation treatments in both seasons. It was found that millablecane length was gradually increased as numbers of irrigation were increased, this may be due to the deleterious effect of soil moisture stress on cell division and cell elongation. Similar results obtained by Bekheet (2001) and Ali (2007). The available data in Table (1) showed that the millable cane length were increased gradually by increasing K level up to 60 kg / fed .in both seasons. Bekheet (2006) and Soomro *et al.*,(2014) obtained similar trend. The results in Table (1) showed that the interaction effect between irrigation treatment and potassium fertilizer levels was significant in the both seasons. Fertilizing sugar cane with 60 kg and irrigated 22 irrigation produced the tallest millable cane yield, while the shortest millable cane resulted for 20 kg K_2O /fed. with 16 irrigations treatments in the both seasons.

2-Number of millable cane/m^2 :

Results recorded in Table (2) indicated that the number of millable cane/m^2 was significantly affected by the studied irrigation treatments in the both seasons. The highest number of millable cane per m^2 was obtained 22 irrigation while, the lowest values resulted from 16 irrigation in the both seasons. Applying irrigation water more frequently ensured favorable

water supply may enhance cell division as well as the absorption of water and nutrients, which positively reflected in increasing plant tillering ability. Similar result was obtained by Bekheet(2006).Data in Table (2) showed that increasing potassium fertilizer was significantly increased number of millable cane / m^2in both seasons. Fertilizing sugar cane with 60 and 50 kg K_2O/ fed. gave highest values in first and second seasons, respectively. These results indicated, that sugar cane as a robust tillering plant needs to raise level of k fertilizer for better growth and to attain higher number of millable cane / m^2. Date given in Table (2) revealed that number of millable cane /m^2 insignificantly responded to the interaction effect in the two seasons.

3- Diameter of millable cane (cm)

The results obtained in Table (3) cleared that the differences in millable cane diameter between the studied irrigation treatments were significant in both seasons. Increasing number of irrigations caused a relative increase millable cane diameter, the highest values obtained from 22 irrigation both seasons. It could be concluded that increasing millable cane diameter by increasing number of irrigations are in line with obtained by El- Shafai (1996) who found that irrigation at shorter inter-vales increased stalk diameter. Data in Table (3) clearly showed that fertilization levels of potassium had significant effect on millable cane diameter in both seasons. The positive effect of the highest potassium level may be due the most important element for sugar cane. Taha *et al.,* (2003) reported similar results.Also, data revealed that the interaction effect of the two studied factors was significant in the second season. The highest values of this trait obtained by 22 irrigations with 60 kg K_2O/fed., while the lowest ones produced by 16 irrigations treatment with 20 kg k_2o/fed. in both seasons.

4- Millable cane yield (ton/fed):

The effect of irrigation treatments, potassium fertilizer levels and their interaction on cane yield /fed in both seasons was presented in Table (4). The obtained results indicated that the differences in cane yield due to irrigation treatments were significant in both seasons.Applied 22 irrigations caused a relative increase in the value of cane yield /fed. amounted by 1.71 and 4.27 ton compared with those 19 and 16 irrigations in the first season, corresponding to 0.77 and 5.50 ton /fed. in the second one. These results showed the positive effect of increasing irrigation number for better growth of sugarcane since water is considered the most important factor in plant such as photosynthesis, absorption of nutrients and sugar translocation and storage, which reflected in the higher cane yield.Also, these results may be attributed to the increase in millable cane length, number of millable cane /fed. And millable cane diameter Tables (1,2 and 3) successively as number of irrigation was 22 irrigations, these results reflected on cane yield /fed.Similar results obtained by Gomaa (2000), Bekheet (2006), Bahraini *et al.*,(2009) and Mushtaq *et al.*,(2017). Data in Table

(4) distinctly that cane yield /fed was significantly affected by potassium fertilizer levels in both seasons. The highest cane yield was obtained by 60 kg K_2O /fed. in both seasons, while the lowest one recorded for 20 kg K_2O, these results may be due to the beneficial influence of increasing level of potassium on the growth of sugarcane plants in respect to millable cane length, number of millable cane m^2 and diameter of millable cane Table (1, 2 and 3), which reflected on cane yield /fed. These results are in accordance with those obtained by Taha *et al.,* (2003) El Tilib*et al.,* (2004), and Abd El- Kader (2017). The interaction effect between the two studied factors was significant in the two seasons. The highest cane yield resulted from plants irrigated by 22 irrigation and fertilized with 60 kg K_2O (71.95 ton/fed.) in the first season, while irrigated plants by 19 irrigation with 60 kg K_2O /fed gave the highest value (70.86 ton/fed) in the second season. On the other hand, the lowest value resulted from using 16 irrigations with 20 kg K_2O /fed.in the first seasons, while irrigated plants by 19 irrigation with 20 kg K_2O/fed. gave the lowest value in the second season.

5- Sugar yield (ton/fed.):

Data in Table (5) revealed that the effect of irrigation treatments, potassium fertilizer levels and their interaction on sugar yield (ton/fed.) in both seasons. The obtained results showed that the differences in sugar yield due irrigation treatments were significant inthe two seasons. Used 22 irrigation treatments caused increase in sugar yield (ton/fed.). The highest sugar yield was obtained by used 22 irrigations in both seasons. While, the lowest one obtained by 16 irrigations. These results may be due to that increasing irrigation frequency at the case of increasing number of irrigations increased water in the soil and hence improved the quality of sugar cane yield. The same results were obtained by Imbaby (2003) and Ali (2007). Data in Table (5) showed that sugar yield (ton/fed.) was significantly affected by potassium fertilizer levels in the two growing seasons. The highest sugar yield was obtained by applied 60 kg K_2O /fed. (7.44 and 8.62 ton/fed.), while using 20 kg K_2O /fed. produced (4.65 and 5.99 ton/fed.) in first and second seasons, respectively. These results showed the positive effect of increased potassium levels for better growth of sugarcane since potassium is considered important for the sugar cane plants, such as photosynthesis, absorption of nutrients and sugar translocation and storage, which reflected in the higher sugar yield. Similar results obtained byMokadem and tantawy (1999), Gomaa (2000), Bekheet (2006) and mushtaq *et el* (2017). The interaction effect between the two studied factors was significant in the two growing seasons. The highest sugar yield (ton/fed.) resulted from plants irrigated by 22 irrigations and fertilized with 60 kg K_2O/fed. in the both seasons. On the other hand, the lowest values resulted from using 16 irrigation with 20 kg K_2O/fed. in the first season, while irrigated plants by 16 irrigation with 30 kg K_2O/ fed. gave the lowest value in the second season.

II- Effect of irrigation treatments, potassium fertilizer and their interactions on Juice quality characters:

1-Total soluble solids (TSS %):

Results in Table (6) indicated that irrigation treatments significantly affected total soluble solids (TSS %) in both seasons. Irrigation of sugarcane plants by 22 irrigations for this trait resulted the greatest TSS%, while applying 16 irrigations recorded the lowest values in both seasons. These results may be due to that increasing irrigation frequency at the case of increasing number of irrigation, increased water in the soil and hence improved the growth and juice quality of sugarcane. The same results were obtained by Imbaby (2003) and Ali (2007). The results in Table (6) showed that (TSS %) responded positively and gradually to the increase in the applied levels of potassium in the two seasons. These results could be due to the role of higher potassium mobility from the older parts of the plants to the new parts. The present results are in general agreement with those reported by Abo El- Wafa *et al.,* (2006)who found that the application of 72 kg K_2O /fed . gave the highest values of TSS% .and Soomoro *et al.,* (2014).Total soluble solids (TSS %) was significantly affected by the interaction between irrigation treatments and potassium fertilizer in both seasons. (Table 6). The highest values of TSS% obtained by 22 irrigations treatment with 60 kg K_2O in both seasons.

2- Sucrose percentage:

The results in Table (7) indicated that irrigation treatments significantly affected sucrose percentage in both seasons. Irrigation of sugarcane plants by 22 irrigations caused the highest sucrose percentage of 17.90 and 18.40 % in the first and second seasons, respectively, while applying 16 irrigations recorded the lowest values of 17.07.and 17.74% in the first and second season, respectively. These results may be due to increase irrigation water more frequently improved favorable growth conditions, which positively reflected in increasing sucrose percentage. Similar results were obtained by Ali (2007) and Uribe *et al.,* (2013). Concerning the effect of potassium fertilizer on sucrose percentage, the results (Table7) indicated that sucrose percentage positively and gradually responded to the increase in applied level of potassium fertilizer up to 60 kg K_2O /fed. in the two seasons. Fertilizing sugarcane with 60 kg K_2O /fed. recorded the highest values of sucrose percentage of 17.95.and 18.63% in the first and second season, respectively, while applying 20 kg K_2O /fed. recorded the lowest ones in both seasons. These results are in accordance with those reported by Taha *et al.,* (2003) and Ali (2007).

Results recorded in Table (7) showed that the interaction effect between irrigation treatment and potassium fertilizer on sucrose percentage. Irrigation treatment (22 irrigations) with 60 kg K_2O /fed. gave the highest values of sucrose percentage of 18.28 and 18.84% in 2013/2014 and 2014/2015 seasons, respectively. This finding may be

considered a good condition for the suitable amount of potassium fertilization. Similar results obtained by Ali (2007).

3-Purity percentage:

Data in Table (8) showed that the effect of irrigation treatments on purity percentage. The maximum values of purity percentage of 87.00 and 88.37% was achieved when applying 19 irrigations. On the other hand, the lowest ones of 86.05 and 88.12 % were obtained from 16 irrigations treatments in first and second seasons. The increase in purity percentage with increasing number of irrigation (19 or 22 irrigations) compared with (16 irrigations) may be due to the increase in sucrose percentage (Table 8) caused by (19 and 22 irrigations) treatment led to increasing purity percentage. This result is in accordance with those obtained by Yung *et al.,* (1995), Ali (2007) and Uribe *et al.,* (2013). Results obtained in Table (8) cleared that potassium fertilizer levels caused significant effect on purity percentage in both seasons. The highest values of purity percentage of 87.43 and 88.89% were recorded for 30 kg K_2O in the first and second growth seasons, respectively. On the contrary, the lowest values of 85.26 and 86.69% obtained by applied 60 kg K_2O /fed and 40 kg K_2O /fed. in 2013/2014 and 2014/ 2015 seasons, respectively.The inverse response in the values of juice purity percentage due or owing to the increase in potassium levels (40 or 60 kg k_2o /fed.) mainly due to the fact that increasing potassium level increased reducing sugars which consequently lower purity percentage. These results are in agreement with that obtained by Ali (2007) and Abo El wafa *et al.,* (2006).The effect of interaction between irrigation treatment and potassium fertilizer levels on purity percentage was significant in both seasons, The highest values of 89.88 and 89.98 % obtained by applied 20 kg K_2O /fed. with 16 irrigations in the first season and by 22 irrigations with 20 kg K_2O /fed. in the second season, respectively.

4-Sugar recovery percentage:

Irrigation treatment, potassium fertilizer levels and their interaction effects on sugar recovery percentage in both seasons are presented in Table (9) . The obtained results showed that the differences in sugar recovery percentage due to irrigation treatments were significant in the two seasons. Irrigation's treatments caused increase in the values of sugar recovery, the highest values were obtained by used 22 and 19 irrigations in first and second seasons, respectively. While, the lowest ones obtained by 16 irrigations. The same results were obtained by Imbaby (2003) and Ali (2007). Data in Table (9) reported that sugar recovery percentage was significantly affected by potassium fertilizer levels inthe two seasons. The highest percentage was obtained by applied 60 kg K_2O/fed. in both seasons, while the lowest values were obtained with 20 and 30 kg K_2O/fed. in first and second seasons, respectively. These results showed the positive effect of increasing potassium levels for improving growth of sugarcane, photosynthesis, absorption of nutrients and sugar translation and

storage, which reflected in sugar recovery percentage Similar results were obtained by Gomaa (2000), Bekheet (2006) and mushtaq *et al.*, (2017).The interaction effect between the two studied factors was significant in the both growing seasons. The highest sugar recovery percentage was obtained by irrigated 22 and 19 irrigations and fertilized 60 kg K_2O/fed. in the first and second seasons, respectively. On the other hand, the lowest one was obtained by using 16 irrigation with 20 kg K2O/fed. in both seasons.

5- Reducing sugars percentage.

Result given in Table (10) showed the effect of irrigation treatments, potassium fertilizer levels and their interaction on reducing sugar percentage. It is worthy to note that reducing sugars percentage is very important for the sugar industry it is well know that each molecules of the reducing sugars prevent two molecules of sucrose to be crystallized. Data in Table (10) revealed that irrigation treatments exhibited significant effect on reducing sugar percentage in both seasons. An increase in reducing sugar percentage was recorded as irrigations number decreased from 22 to 16 irrigations and from 19 to 16 irrigations, this was true in both seasons.It is worth mentioning that the lowest values of reducing sugars percentage of 0.338and 0.363 in first and second seasons, respectively obtained with adding 22 irrigations treatment. Similar results reported by Altaf *et al* (1998), johari *et al* (1998) and imbaby (2003) who reported that irrigation treatments caused significant differences in juice quality. These results may be due that increasing number of irrigations increased water content in millable cane and hence decrease reducing sugars percentage. Potassium fertilizer levels had significant effect on reducing sugars percentage in both seasons.It could be noted that the lowest values of 0.322 and 0.328% in first and second seasons attained from using 20 kg K_2O /fed. On the other hand, the highest values of 0.379 and 0.410% produced for plants fertilized by 60 kg K_2O /fed. in the both growing seasons. These results could be attributed to increasing the concentration of potassium in the juice. Similar results obtained by Nassar (1996), Vijay –Kumar *et al.*, (2000) and Abo El- wafa *et al.*, (2006). The interaction between irrigation treatment and potassium fertilizer levels showed a significant effect on the values of reducing sugar percentage in both seasons. The combination between 22 irrigation treatments with 20 kg K_2O /fed. recorded the lowest values of 0.310 and 0.320 % in first and second seasons, while the highest ones obtained for 16 irrigations treatment with 60 kg K_2O (0.379 and 0.410) in first and second seasons, respectively.

Table (1) Effect of irrigation treatments, potassium fertilizer and their interaction on millable cane length (cm) at harvest in 2013/2014 and 2014/2015 seasons

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed (B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		249.7	231.6	210.1	231.5	254.7	236.5	215.2	236.3
30		261.8	249.9	240.2	248.6	268.8	250.9	247.3	255.7
40		278.0	272.8	250.4	267.3	287.0	281.7	259.5	276.2
50		292.9	278.7	275.3	280.8	303.9	288.7	281.8	291.7
60		300.6	300.0	290.2	296.5	313.6	313.1	303.0	309.3
Mean		276.6	266.6	251.4	264.6	285.6	275.5	260.5	273.8
L.S.D at 05	A		3.7				4.1		
	B		3.4				3.8		
	AB		6.3				7.2		

Table (2) Effect of irrigation treatments, potassium fertilizer and their interaction on number of millable cane (m2) at harvest in 2013/2014 and 2014/2015 seasons

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		16.7	16.4	16.3	16.5	17.1	15.5	15.8	16.2
30		16.1	16.6	16.3	16.3	17.1	18.1	17.3	17.5
40		17.9	17.7	17.0	17.5	17.5	18.0	17.4	17.6
50		18.0	17.8	17.2	17.7	17.6	18.2	17.5	17.8
60		18.1	17.8	17.5	17.8	17.9	18.2	17.7	17.7
Mean		17.4	17.3	16.9	17.2	17.9	17.6	17.1	17.3
L.S.D at 05	A		32.7				N.S		
	B		8.51				1.94		
	AB		N.S				N.S		

Table (3) Effect of irrigation treatments, potassium fertilizer and their interaction on diameter of millable cane .(cm) at harvest in 2013/2014 and 2014/2015 seasons

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		2.52	2.50	2.40	2.50	2.84	2.61	2.60	2.68
30		2.73	2.51	2.41	2.55	2.87	2.63	2.71	2.73
40		2.86	2.55	2.41	2.60	3.08	2.82	2.71	2.87
50		3.00	2.59	2.54	2.71	3.09	2.84	2.70	2.88
60		3.19	2.70	2.69	2.86	3.21	2.95	2.85	3.00
Mean		2.86	2.57	2.47	2.64	3.02	2.77	2.71	2.83
L.S.D at 05	A	0.12				0.11			
	B	0.13				0.15			
	AB	0.21				0.26			

Table (4) Effect of irrigation treatments, potassium fertilizer and their interaction on millable cane yield (ton/fed) in 2013/2014 and 2014/2015 seasons

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		49.10	47.92	41.14	48.05	50.20	50.19	54.54	48.94
30		50.62	50.43	50.05	50.33	53.62	53.78	50.91	52.74
40		56.75	56.94	55.96	56.55	60.43	57.40	56.15	57.92
50		71.73	66.55	62.57	66.95	69.35	67.77	59.90	65.62
60		71.95	69.76	63.09	68.27	69.85	70.86	62.85	67.85
Mean		60.03	58.32	55.76	57.98	60.73	59.96	55.23	58.64
L.S.D at 05	A	4.83				2.03			
	B	5.18				3.36			
	AB	1.43				7.05			

Table (5): Effect of irrigation treatments, potassium fertilizer and their interaction on sugar yield (ton/fed) in 2013/2014 and 2014/2015 seasons

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		5.83	5.53	4.65	5.56	6.24	6.31	6.40	5.99
30		6.13	6.06	5.79	5.99	6.58	6.60	6.06	6.41
40		6.99	6.94	6.49	6.80	7.48	7.20	6.84	7.16
50		8.83	8.25	7.20	8.08	8.70	8.51	7.45	8.18
60		8.92	8.62	7.44	8.32	8.92	9.12	7.84	8.62
Mean		7.38	7.17	6.44	6.92	7.58	7.53	6.71	10.61
L.S.D at 05	A		0.19				0.05		
	B		0.22				0.40		
	AB		0.28				0.24		

Table (6): Effect of irrigation treatments, potassium fertilizer and their interaction on Total soluble solids percentage (TSS %) in 2013/2014 and 2014/2015 seasons.

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		20.15	20.11	19.57	19.94	21.39	20.45	19.81	20.55
30		20.25	20.23	19.93	20.13	21.60	21.12	20.39	21.03
40		20.96	20.38	19.85	20.39	21.60	20.96	20.22	20.92
50		21.32	20.37	20.27	20.65	21.81	21.28	20.75	21.28
60		21.46	21.28	20.44	21.06	22.15	21.63	21.01	21.59
Mean		20.82	20.47	20.01	20.43	21.71	21.08	20.43	21.07
L.S.D at 05	A		0.31				0.18		
	B		0.11				0.17		
	AB		0.41				0.35		

Table (7): Effect of irrigation treatments, potassium fertilizer and their interaction on sucrose percentage in 2013/2014 and 2014/2015 seasons.

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		17.40	17.05	16.67	17.04	18.29	18.19	17.16	17.85
30		17.65	17.56	17.03	17.41	18.20	18.05	17.49	17.91
40		18.06	17.77	17.04	17.62	18.29	18.28	17.71	18.08
50		18.15	17.96	17.23	17.78	18.41	18.38	18.11	18.30
60		18.28	18.19	17.39	17.95	18.84	18.79	18.26	18.63
Mean		17.90	17.70	17.07	17.55	18.40	18.33	17.74	18.15
L.S.D at 05	A		0.09				0.08		
	B		0.12				0.10		
	AB		0.21				0.19		

Table (8): Effect of irrigation treatments, potassium fertilizer and their interaction on purity percentage in 2013/2014 and 2014/2015 seasons.

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		86.35	84.76	89.88	86.99	89.98	85.47	87.88	87.71
30		87.16	89.70	85.44	87.43	89.85	89.01	87.71	88.89
40		86.16	86.89	85.84	86.29	87.07	89.51	86.51	86.69
50		85.14	88.16	85.01	86.30	86.30	89.11	89.40	88.27
60		85.19	85.50	85.09	85.26	87.80	88.29	89.30	88.46
Mean		86.25	87.00	86.05	86.08	88.20	88.37	88.12	88.19
L.S.D at 05	A		0.87				N.S		
	B		0.83				0.69		
	AB		1.12				1.15		

Table (9) Effect of irrigation treatments, potassium fertilizer and their interaction on Sugar recovery percentage in 2013/2014 and 2014/2015 seasons

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		11.89	11.55	11.32	11.58	12.44	12.58	11.75	12.25
30		12.12	12.03	11.58	11.91	12.29	12.28	11.92	12.16
40		12.33	12.20	11.61	12.03	12.38	12.56	12.19	12.37
50		12.32	12.40	11.52	12.08	12.44	12.57	12.44	12.48
60		12.41	12.37	11.80	12.19	12.78	12.88	12.48	12.71
Mean		12.21	12.11	11.56	11.95	12.46	12.57	12.15	12.39
L.S.D 5%	A		0.09				0.11		
	B		0.10				0.22		
	AB		1.07				1.12		

Table (10): Effect of irrigation treatments, potassium fertilizer and their interaction on reducing sugar percentage in 2013/2014 and 2014/2015 seasons.

Treatments		**2013/2014**			**Mean**	**2014/2015**			**Mean**
K Fertilizer kg/fed(B)		Number of irrigations(A)				Number of irrigations(A)			
		22	19	16		22	19	16	
20		0.310	0.319	0.336	0.322	0.320	0.324	0.342	0.328
30		0.321	0.332	0.348	0.333	0.331	0.338	0.351	0.340
40		0.342	0.351	0.369	0.352	0.372	0.386	0.399	0.385
50		0.353	0.367	0.382	0.367	0.393	0.397	0.411	0.400
60		0.367	0.371	0.399	0.379	0.399	0.401	0.430	0.410
Mean		0.338	0.348	0.367	0.351	0.363	0.369	0.386	0.372
L.S.D at 05	A		0.018				0.017		
	B		0.021				0.032		
	AB		0.035				0.042		

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تأثير الرى والتسميد البوتاسى على محصول وصفات جودة قصب السكر تحت ظروف محافظة أسوان

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أقيمت تجربة حقلية فى مزرعة خاصة بمحافظة أسوان خلال موسمي 2013 /2014، 2014 / 2015 لدراسة تأثير نظام الري والتسميد البوتاسى على محصول وصفات جودة قصب السكر. تضمنت كل تجربة على خمسة عشر معاملة تمثل التوافيق المختلفة بين ثلاث معاملات للرى (الرى العادى لقصب السكر "إجمالي 22 رية خلال الموسم" – منع رية واحدة خلال شهور أبريل ، يوليو ، أكتوبر "إجمالي 19 رية خلال الموسم" – منع ريه واحدة خلال شهور أبريل ، مايو ، يونيو ، ويوليو ، أغسطس ، سبتمبر "إجمالي 16 رية خلال الموسم ") ، وخمس معاملات للتسميد البوتاسى (20 ، 30 ، 40 ، 50 ، 60 كجم بو$_2$ / فدان) ، أستخدم تصميم القطع المنشقة مرة واحدة فى أربعة مكررات فى موسمي التجربة ، حيث تم وضع معاملات الري فى القطع الرئيسية ، ووزعت مستويات التسميد البوتاسى عشوائيا على القطع المنشقة ، وكانت مساحة القطعة التجريبية 21 متر مربع عبارة عن ستة خطوط بطول 3,5 متر وعرض واحد متر. زرعت التجربة فى الأسبوع الأول من مارس وأستخدم الصنف جيزة تايوان 9/54 (سى 9). ويمكن تلخيص النتائج المتحصل عليها فيما يلى:

- أوضحت النتائج أن صفات طول الساق القابل للعصير، عدد السيقان (العيدان) القابلة للعصير فى المتر مربع، قطر العود القابل للعصير، محصول السيقان طن/ للفدان ، محصول السكر للفدان ، النسبة المئوية للمواد الصلبة الذائبة الكلية ، النسبة المئوية للسكروز، النسبة المئوية لناتج السكر قد تأثر معنويا بمعاملات الري فى كلا موسمي التجربة. وأمكن الحصول على أعلى القيم عند معاملة 22 رية للفدان. كما أثرت مستويات التسميد البوتاسى معنويا وإيجابيا على نفس الصفات وأعطت المعاملة 60كجم بو$_2$ / فدان أعلى القيم.وأشارت النتائج الى وجود تأثير معنوى للتفاعل بين معاملات الرى والتسميد البوتاسى ، وكان الرى بمعاملة 22 رية مع التسميد البوتاسى بمعدل 60كجم بو$_2$ / فدان قد أعطى أعلى القيم خلال موسمى التجربة.
- تأثرت النسبة المئوية لنقاوة العصير، النسبة المئوية للسكريات المختزلة معنويا بمعاملات الرى، حيث حقق زيادة معدلات الرى حتى 22 رية للفدان إلى الحصول على أعلى القيم من النسبة المئوية لنقاوة العصير خلال موسمى التجربة. وعلى العكس من ذلك فأن الزيادة في النسبة المئوية للسكريات المختزلة نتجت عن نقص عدد الريات من 22 إلى 16 رية للفدان خلال موسمي التجربة. كما أدت زيادة معدل السماد البوتاسى الى عدم نقص النسبة المئوية للنقاوة، النسبة المئوية للسكريات المختزلة فى خلال موسمي التجربة.
- أوضحت الدراسة إلى أن زراعة صنف قصب السكر جيزة تايوان 9/54 (سى 9) تحت ظروف محافظة أسوان، وريه بمعدل 22 رية للفدان مع التسميد بمعدل 60 كجم بو$_2$ / فدان اعطى أعلى محصول للسيقان (العيدان) والسكر للفدان.