RESULTS AND DISCUSSION

The results collected could be illustrated and discussed under the following topics:

I- Growth parameters of sugar cane varieties with relation to irrigation system and nitrogen fertilizer.

II- Juice quality of sugar cane stalks with relation to irrigation system and nitrogen fertilizer.

III- Yield and yield components with relation to irrigation system and nitrogen fertilizer.

I- Growth Parameters of sugar cane varieties with relation to irrigation system and nitrogen fertilizer

1- Number of tillers/m. :

Growth criteria in terms of number of tillers, stalks dimension and stalk elongation rate are considered a good indication and reflection to the expected yield.

Results presented in Tables (1 and 2) show the influence of irrigation systems and nitrogen fertilizer on tillering capacity of sugar cane varieties under the used treatments.

The obtained results show that irrigation system had no significant effect on the number of tillers/m. These results were fairly true for the both ages of growth i.e. 120 and 180 days in the first season and at 180 days in the second season. At 120 days after planting in the secondseason , the differences in number of tillers/m between drip irrigation and furrow irrigation was significant. It is worth mentioning that sugar cane plants under drip irrigation system gave the highest value of number of plant/m (16.62) compared to furrow irrigation (10.70). It could be concluded that

Table (1): Effect of irrigation systems and nitrogen fertilizers on number of tillers/m of some sugar cane varieties.(1992)

Treatments	varieties	120 days Kg.N/fed			Average	180 days Kg.N/fed.			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	5.41	5.82	7.11	6.11	16.8	16.58	21.01	18.13
	F 153	4.60	6.24	7.37	6.07	15.55	18.31	18.64	17.50
	G 74-96	5.84	6.14	5.94	5.97	16.71	19.45	18.60	18.25
Average		5.28	6.07	6.86	6.05	16.35	18.12	14.42	17.96
Furrow irrig	G.T54-9	4.15	4.44	4.00	4.20	12.85	14.42	17.85	15.04
	F153	4.71	7.20	8.32	6.74	14.42	16.42	17.14	16.00
	G74-96	92	4.905.	4.91	5.24	1.442	15.35	18.37	16.69
Average		4.39	5.51	5.74	5.39	13.90	15.40	17.85	15.72
V XN	G.t 54-9	4.78	5.13	5.55	5.15	14.82	15.50	19.42	16.59
	F 153	4.65	6.72	7.64	6.40	14.98	17.37	17.88	16.75
	G.74- 96	5.88	5.52	5.42	5.61	15.57	17.40	18.58	17.18
Total average		5.10	5.79	6.27	5.71	15.13	16.76	18.63	16.84

L .S .D at 5% Level		NS
Irrigation (I)	= NS	NS
Varieties (V)	=NS	2.31
Nitrogen (N)	=NS	NS
IXV	=NS	NS
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	

Table (2): Effect of irrigation systems and nitrogen fertilizers on number of tillers/m of some sugar cane varieties. (1993)

Treatments	varieties	120 days Kg.N/fed			Average	180 days Kg.N/fed.			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	14.85	16.78	17.85	16.50	20.01	28.92	26.07	23.45
	F 153	16.42	18.50	17.51	17.47	22.07	25.71	24.64	24.14
	G 74-96	14.14	18.42	17.14	15.90	21.28	22.85	23.92	22.69
Average		15.14	17.23	17.50	16.62	21.11	24.16	25.01	23.42
Furrow irrig.	G.T54-9	9.21	12.07	12.50	11.26	14.50	19.07	19.64	17.73
	F153	8.57	13.14	11.28	11.02	17.71	21.07	18.64	19.14
	G74-96	9.07	10.07	10.35	9.83	16.50	19.85	19.42	18.59
Average		8.95	11.78	11.38	10.70	16.23	20.01	19.23	18.49
V XN	G.t 54-9	12.03	14.42	15.17	13.88	17.25	21.50	23.03	20.59
	F 153	12.50	15.85	14.39	14.25	19.89	23.39	21.06	21.64
	G.74- 96	11.60	13.26	13.75	12.86	18.89	21.35	21.67	20.65
Total average		12.04	14.51	14.44	13.66	18.67	22.08	22.11	20.96

L .S .D at 5% Level

Irrigation (I)	= 1.38	NS
Varieties (V)	=NS	NS
Nitrogen (N)	=NS	1.48
IXV	=NS	NS
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	NS

the distinct influence on number of sugar cane plants/m. was mainly due to the irrigation system . The pronounced effect of drip irrigation system basically is due to tihis type of irrigation continuously provided the superficial roots by tiher needed water thrpugh the different periods of growth. However ,under furrow irrigation system the use of water effeciency is too low in addition to the leaching of nutrients with the drainage water. Moreover ,drip irrigation increased number of plants by 14.2 %and 26.7%at 180 days in the first and scend seasons respectively over those under surface irrigation.

These results are in line with those reported by Soopramanien, *et al.* (1989) and Gupta and Sharama (1990).

Concerning the effect of nitrogen fertilizer on the number of tillers/m, there was a tendency to increase the number of tillers as nitrogen dose increased up to 210 Kg/fed. at 120 and 180 days from planting in both growing seasons. However, the differences between nitrogen doses failed to reach the level of significance in their effect on this character at 120 days in the two seasons. Increasing nitrogen dose from 150 up to 210 kg/fed.increased number of tillers from 15.13 to18.3 in the first season and from 18.67 to 22.11 tillers in the second season ,at 180 days .It could be concluded that the number of tillers/m was broadly respoded to raising nitrogen level. This response was clear at 180 days after planting. The increase in number of tillers/m due to higher levels of nitrogen application is mainly due to the role of nitrogen in activating the meristemic activity which contriputed to the production of new organs. In addition to nitrogen stimulate the metabolic activity in plants contributing to the increase in the metabolets which are used in building plant organs such as tillers and leaves.Tillers are considered the external expression of meristemic

activity.These results are in agreement with those found by Jayabal, *et al.* (1989) and Abd-El-Gawad, *et al.*(1992-A).

As for the varietal effect on the number of stalks/m, the presented results show that there was no significant effect on this character due to the used varieties in both seasons . The used varieties did not differ in the number of tillers/m at different stages in the two seasons.

The effect of interaction between irrigation systems,nitrogen levels and varieties on number of stalks/m was not significant at different stages of growth in the two seasons.

2-Stalk dimensions:

Stalk dimensions in terms of stalk height and stalk diameter represent the morphological cite to the accmulative capacity for sugar cane plants.

A- Stalk height:

The effect of irrigation system and nitrogen fertilizer on the stalk height of some sugar cane varieties is presented in Tables (3 and 4). The available results cleared that stalk height of sugar cane plants were insignificantly affected by irrigation systems in the first and second seasons at harvest. However, data clear that drip irrigation system surpassed the other one in stalk height by 5.3% and 5.0% at harvest in the first and second seasons, respectively.

Regarding the effect of the used irrigation systems on stalk height during the different stages of growth, the results presented in Table (3) reveal that there was a significant effect only at 360 days in the first season

Table (3): Effect of irrigation systemsand nitrogen fertilizer on stalk height (cm) of some sugar cane varieties at different stages of growth(1992)

Treatments	Varieties	240 days Kg N./fed.			Aver.	300 days Kg N./fed.			Aver.	360 days Kg N./fed.			Aver.	420 days at harvest Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	124.00	130.00	127.50	127.16	182.50	198.00	211.00	190.50	245.00	275.00	295.00	271.00	277.00	310.00	317.75	301.58
	F 153	115.00	114.00	125.00	118.00	177.50	182.50	188.00	182.66	220.00	237.50	235.00	230.83	250.00	266.50	271.00	262.50
	G. 74-96	127.00	125.00	118.50	123.50	164.00	168.50	188.00	173.50	209.00	226.50	230.00	221.83	260.50	258.50	266.00	261.66
Average		122.00	123.00	123.66	122.88	168.00	183.00	195.66	182.22	224.66	246.33	253.33	241.44	262.50	278.33	284.91	275.25
Furrow Irrigation	G.T 54-9	117.50	125.50	117.50	120.16	148.00	174.00	169.50	163.83	22.50	235.00	247.50	235.00	241.50	265.00	285.00	263.83
	F 153	113.00	111.50	122.00	115.50	179.00	181.00	187.00	182.33	219.00	225.50	227.50	224.00	254.00	266.00	271.00	256.83
	G. 74-96	119.50	122.50	105.00	115.66	183.00	168.50	181.00	177.50	205.00	227.50	232.50	221.66	248.50	251.00	271.00	256.83
Average		116.66	119.83	114.83	117.11	170.00	174.50	179.16	174.55	215.50	229.33	235.83	226.88	248.00	260.00	275.66	261.44
V x N	G.T 54-9	120.75	127.75	122.50	123.66	155.25	186.00	190.25	177.16	233.75	255.00	271.25	253.33	229.25	287.50	301.27	282.70
	F 153	114.00	112.75	123.50	116.75	178.25	181.75	187.50	182.50	219.50	231.50	231.25	227.41	252.00	266.25	271.00	263.08
	G. 74-96	123.25	125.75	111.75	119.58	173.50	168.50	184.50	175.50	207.00	227.00	227.00	231.25	221.75	254.75	268.50	259.25
Total Aver.		119.33	121.41	119.25	120.00	169.00	178.75	187.41	178.38	220.08	237.83	244.16	234.16	255.25	269.50	280.29	268.34

L.S.D at 5 % level:				
Irrigation (I)	NS	NS	13.71	NS
Vrieties (V)	NS	NS	12.49	10.89
Nitrogen (N)	NS	NS	12.49	10.89
I x V	NS	NS	17.67	15.39
I x N	NS	NS	NS	NS
V x n	NS	Ns	NS	NS
I x V x N	NS	NS	NS	NS

Table (4): Effect of irrigation systemsand nitrogen fertilizer on stalk height (cm) of some sugar cane varieties at different stages of growth(1993)

Treatments	Varieties	240 days Kg N./fed.			Aver.	300 days Kg N./fed.			Aver.	360 days Kg N./fed.			Aver.	420 days at harvest Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	107.00	117.50	125.00	116.50	212.50	246.00	245.00	234.66	272.50	290.00	298.00	286.83	297.00	325.00	330.00	317.33
	F 153	143.00	136.50	117.00	132.16	175.00	192.50	214.00	193.83	225.00	240.00	263.00	242.66	293.00	277.50	304.00	291.50
	G. 74-96	127.00	108.00	110.00	108.50	177.50	205.00	208.00	196.83	227.50	238.50	252.50	239.50	253.00	264.00	268.00	261.66
Average		119.33	121.33	116.83	119.16	188.33	214.66	222.33	808.44	241.66	256.16	271.16	256.33	281.00	288.33	300.66	290.16
Furrow Irrigation	G.T 54-9	98.50	111.50	94.00	101.33	187.50	202.50	226.50	205.50	247.50	252.50	275.00	258.33	280.00	290.00	304.00	291.33
	F 153	108.00	119.50	115.00	114.16	149.00	162.50	175.50	162.33	242.50	246.50	252.50	247.16	260.00	271.50	277.50	269.66
	G. 74-96	113.00	109.50	107.00	109.83	170.00	171.50	237.50	238.50	248.50	241.50	262.50	270.00	270.50	276.22	271.00	256.83
Average		106.50	113.50	105.33	108.44	169.00	177.66	192.66	179.50	242.50	245.83	258.66	249.00	267.50	277.16	284.00	276.22
V x N	G.T 54-9	102.75	114.50	109.50	108.91	200.00	224.50	235.75	220.08	260.00	271.25	286.50	272.58	288.50	307.50	317.00	304.33
	F 153	125.50	128.00	116.00	123.16	162.00	177.50	194.75	178.08	233.75	243.25	257.57	244.91	276.50	274.50	290.75	280.58
	G. 74-96	110.50	109.75	107.75	109.33	174.00	186.50	192.00	184.16	232.50	238.50	250.50	240.50	257.75	267.00	269.25	264.66
Total Aver.		112.91	117.41	111.80	113.80	178.66	196.16	207.50	194.11	242.08	251.00	264.91	252.66	274.25	283.00	292.33	283.19

L.S.D at 5 % level:				
Irrigation (I)	NS	2.66	NS	NS
Vrieties (V)	8.22	13.61	10.83	20.83
Nitrogen (N)	NS	13.61	10.83	NS
I x V	NS	NS	15.33	NS
I x N	NS	NS	NS	NS
V x N	NS	NS	NS	NS
I x V x N	NS	NS	NS	NS

where drip irrigation recorded an increase amounted to 6.40% over the furrow irrigation.

Similar result was obtained at 300 days after planting in the second season Table (4). It could be concluded that sugar cane plants under drip irrigation were taller than that under furrow one. These results are in agreement with those mentioned by Prasad, *et al.* (1991) and Subramanian, *et al.* (1991).

As for the effect of nitrogen fertilizer on stalk height at harvest, data shown in Table (3) clear that there was a significant gradual increase in this ccharacter accompanied to the increasing doses of nitrogen fertilizer up to 210 Kg N/fed. in the first season. Meanwhile, nitrogen fertilizer had no significant influence on stalk height in the second season Table (4).

The results presented in Table (3) show that there was insignificant effect on stalk height due to the used nitrogen rates at 240and 300 or 360 days from planting in first season. However, nitrogen fertilizer attained a significant response for this character at 300 and 360 days after planting in the second season Table (4). However, the stalk height responded to the applied nitrogen up 210 kg/fed. and this response was remarked at the late stages of growth. It could be concluded that increasing nittrogen level increased stalk height. This increase may be attributed to the important role of nitrogen in encouraging the meristemic activity in plant in addition to cell elongation. These findings are in line with those showed by Aboyomi , (1987),Lestari , (1989) ; Tishchenko *et al.* (1991) and Bangar, *et al.* (1992).

Regarding the stalk height of used varieties (Tables3 and 4), it could be noticed that GT 54-9 variety attained a significant superiority in respect to plant height (282.70 , 304.33) over the other two varieties followed by F153 (263.08 , 280.58) then G. 74-96 variety (259.25 , 264.66) at harvest in the first and second season, respectivelly. These results were true at the different stages of growth except at 240 and 300 days after planting in the first season. These results are similar to those found by Abd Allah (1984).

It could be concluded that the advantage of drip irrigation system may be due to the continuous and the suitable providing of water and fertilizer around root system of the plant. As well as the important role of nitrogen in plant growth which coincide with those reported by Gascho, et al. (1986) who noticed that nitrogen fertilizer is important for growth and development for sugar cane.

Concerning the effect of interaction between the three studied factors on stalk length, it was not significantly affected by irrigation, nitrogen and varieties interaction except that between irrigation and varieties at 360 days age in the first and second seasons as weel as at harvest in the first season only.

B- Stalk diameter:

Results presented in Tables (5 and 6) show the influence of irrigation system and nitrogen fertilzer on stalk diameter of some sugar cane varieties at different growth stages. In spite of the insignificant differences between the two irrigation systems in stalk diameter, it could be shown that sugar cane thickness was better under drip irrigation system. This result was fairly true under the various growth stages. These results are in agreement with those elucedated by Said Rahman, *et al.* (1991).

Table (5) : Effect of irrigation systemsand nitrogen fertilizer on stalk d iamter(cm) of some sugar cane varieties at different stages of growth(1992)

Treatments	Varieties	240 days Kg N./fed.			Aver.	300 days Kg N./fed.			Aver.	360 days Kg N./fed.			Aver.	420 days at harvest Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	2.50	2.45	2.50	2.48	2.60	2.65	2.65	2.90	2.71	2.78	3.11	3.10	2.99	3.16	3.25	3.10
	F 153	2.35	2.35	2.45	2.38	2.50	2.70	2.73	2.64	2.63	2.71	2.78	2.70	2.73	2.78	2.85	2.78
	G. 74-96	2.25	2.45	2.40	2.36	2.50	2.61	2.58	2.56	2.58	2.70	2.75	2.67	2.70	2.78	2.85	2.77
Average		2.36	2.41	2.45	2.41	2.53	2.65	2.37	2.64	2.66	2.84	2.87	2.79	2.78	2.90	2.98	2.89
Furrow Irrigation	G.T 54-9	2.45	2.40	2.45	2.43	2.55	2.60	2.70	2.62	2.85	2.95	2.96	2.92	2.90	3.06	3.10	3.02
	F 153	2.30	2.45	2.50	2.41	2.45	2.65	2.63	2.57	2.58	2.70	2.85	2.71	2.68	2.86	2.81	2.78
	G. 74-96	2.35	2.45	2.35	2.38	2.45	2.50	2.55	2.50	2.63	2.68	2.75	2.68	2.68	2.78	2.90	2.78
Average		2.36	2.43	2.43	2.41	2.48	2.58	2.63	2.56	2.68	2.77	2.85	2.77	2.75	2.90	2.94	2.86
V x N	G.T 54-9	2.47	2.42	2.47	2.45	2.57	2.62	2.81	2.67	2.81	3.03	3..03	2.96	2.96	2.90	3.11	3..06
	F 153	2.32	2.40	2.47	2.40	2.47	2.67	2.68	2.61	2.60	2.70	2.80	2.70	2.70	2.82	2.83	2.79
	G. 74-96	2.30	2.45	2.37	2.37	2.47	2.55	2.56	2.53	2.60	2.69	2.75	2.68	2.69	2.78	2.87	2.78
Total Aver.		2.36	2.42	2.44	2.41	2.50	2.61	2.68	2.60	2.67	2.81	2.86	2.78	2.76	2.90	2.96	2.87

L.S.D at 5 % level:				
Irrigation (I)	NS	NS	NS.	NS
Vrieties (V)	NS	NS	0.06	0.09
Nitrogen (N)	NS	0.09	0.06	0.09
I x V	NS	NS	NS	NS
I x N	NS	NS	NS	NS
I x V x N	NS	NS	NS	NS

Table (6): Effect of irrigation systemsand nitrogen fertilizer on stalk diamter(cm) of some sugar cane varieties at different stages of growth(1993)

Treatments	Varieties	240 days Kg N./fed.			Aver.	300 days Kg N./fed.			Aver.	360 days Kg N./fed.			Aver.	420 days at harvest Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	2.45	2.65	2.60	2.56	2.70	2.73	2.50	2.64	2.78	2.83	2.89	2.83	2.86	3.16	3.15	3.06
	F 153	2.55	2.16	2.60	2.58	2.60	2.68	2.85	2.71	2.66	2.83	2.85	2.78	2.74	2.86	2.90	2.83
	G. 74-96	2.25	2.50	2.45	2.40	2.55	2.60	2.71	2.62	2.58	2.66	2.73	2.65	2.66	2.75	2.76	2.72
Average		2.41	2.58	2.55	2.51	2.61	2.67	2.68	2.65	2.67	2.77	2.82	2.75	2.75	2.92	2.93	2.87
Furrow Irrigation	G.T 54-9	2.50	2.55	2.60	2.55	2.65	2.66	2.75	2.68	2.72	2.80	2.85	2.79	2.93	2.96	3.02	2.09
	F 153	2.25	2.45	2.55	2.41	.2.55	2.74	2.75	2.68	2.63	2.78	2.78	2.73	2.68	2.78	2.78	2.74
	G. 74-96	2.15	2.35	2.35	2.28	2.50	2.65	2.66	2.60	2.59	2.65	2.76	2.67	2.69	2.72	2.76	2.72
Average		2.30	2.45	2.50	2.41	2.56	2.68	2.72	2.65	2.65	2.74	2.79	2.73	2.77	2.82	2.85	2.81
V x N	G.T 54-9	2.47	2.60	2.60	2.55	2.67	2.69	2.62	2.66	2.75	2.81	2.87	2.81	2.90	3.06	3.08	3..01
	F 153	2.40	2.53	2.57	2.50	2.57	2.71	2.80	2.69	2.64	2.80	2.81	2.75	2.71	2.82	2.84	2.79
	G. 74-96	2.20	2.42	2.40	2.34	2.52	2.62	2.69	2.61	2.58	2.65	2.74	2.66	2.68	2.73	2.75	2.72
Total Aver.		2.35	2.51	2.52	2.46	2.59	2.67	2.70	2.65	2.66	2.75	2.81	2.74	2.76	2.87	2.89	2.84

L.S.D at 5 % level:				
Irrigation (I)	NS	NS	NS	NS
Varieties (V)	0.07	NS	0.04	0.07
Nitrogen (N)	0.07	NS	0.04	NS
I x V	NS	NS	NS	NS
I x N	NS	NS	NS	NS
V x N	NS	NS	NS	NS
I x V x N				NS

The collected results in Tables (5 and 6) appeared a significant response in stalk diameter to high nitrogen application.Increasing nitrogen level up to 210 kg/fed. increased stem diameter by 20 and 13 mm than 150 kg/fed. in the two seasons, respectivily at harvest. It be concluded that higher nitrogen doses caused an increase in stalk diameter. This result was true under the different growth stages except at 240 and 300 days after planting in the first and second seasons, respectively. These findings were in line with those found by Abd-El-Gawad, *et al.* (1992-A) and Bangar, *et al.*, (1992).

As to, varietal effect on stalk diameter, it can be noticed that stalk diameter was greatly affected by varieties. The highest value of stalk diameter was recorded for G.T 54-9 variety (3.06 , 3.01) followed by F153 (2.79 , 2.79) then G.74-96 (2.78, 2.72) at harvest in the first and second season, respectively. This result may be assured that stalk diameter is mainly affected by genetical make up of the tested varieties. It could be concluded that G.T.54-9 variety was superior to F153 with respect to stalk diameter which surpassed that of G.74-96. These observation are in accordance with those reported by Abd Allah (1984).

3- Elongation rate (ER):

Regarding the effect of irrigation system, nitrogen fertilizer on the elongation rate (ER) of some sugar cane varieties, results in Table (7 and 8) show that the studied factors had no significant effect on the elongation rate at harvest in both of growing seasons.

Irrigation systems had an insignificant influence on ER at the different periods of growth in both of the two growing seasons.Regardless

Table (7) Effect of irrigation systems and nitrogen fertilizer on elongation rate (mm/day) of some sugar cane varieties at different stages of growth(1992)

Treatments	Varieties	240-300 days Kg N./fed.			Aver.	300-360 days Kg N./fed.			Aver.	360-420 days Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	9.23	13.41	14.33	12.32	13.71	12.83	14.00	13.51	5.33	5.83	3.79	4.98
	F 153	5.73	7.60	11.83	8.40	7.08	7.08	7.83	7.33	5.00	4.83	5.96	5.26
	G. 74-96	7.66	9.75	13.25	10.22	7.49	9.66	13.38	10.18	8.58	5.33	5.99	6.63
Average		7.54	10.27	13.13	10.31	9.43	9.85	11.73	10.34	6.30	5.33	5.25	5.62
Furrow Irrigation	G.T 54-9	8.24	10.41	12.73	10.46	10.58	10.16	9.49	10.08	3.16	4.99	6.21	4.79
	F 153	11.83	10.23	12.00	11.35	6.66	11.58	6.71	8.31	5.80	6.70	7.25	6.59
	G. 74-96	11.40	10.05	12.30	11.25	3.66	9.83	8.58	7.35	7.23	3.91	6.40	5.84
Average		10.49	10.23	12.34	11.02	6.96	10.52	8.26	8.58	5.39	5.21	6.62	5.74
V x N	G.T 54-9	8.73	11.91	13.53	11.39	12.14	11.49	11.74	11.79	4.24	5.51	5.00	4.88
	F 153	8.78	8.44	11.91	9.88	6.87	9.33	7.27	7.82	5.40	5.78	6.60	5.92
	G. 74-96	9.53	9.90	12.77	10.73	5.58	9.74	10.98	8.76	7.90	4.62	6.19	6.24
Total Aver.		9.01	10.25	12.74	10.66	8.19	10.19	10.00	9.46	5.85	5.27	5.93	5.68

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	NS	2.36	NS
Nitrogen (N)	2.10	NS	NS
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N			

Table (8) :Effect of irrigation systems and nitrogen fertilizer on elongation rate (mm/day) of some sugar cane varieties at different stages of growth(1993)

Treatments	Varieties	240-300 days Kg N./fed.			Aver.	300-360 days Kg N./fed.			Aver.	360-420 days Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	14.58	19.41	19.60	17.86	9.99	7.24	9.25	8.83	4.08	5.83	5.33	5.08
	F 153	9.99	13.08	14.83	12.63	8.33	7.91	8.16	8.13	3.00	6.24	6.83	5.35
	G. 74-96	8.41	13.33	14.91	12.21	8.33	5.58	7.41	7.10	4.25	4.24	2.58	3.69
Average		10.99	15.27	10.44	14.23	8.88	6.91	8.27	8.02	3.77	5.44	4.91	4.71
Furrow Irrigation	G.T 54-9	11.66	12.83	18.16	14.22	9.99	8.33	9.25	9.19	5.41	6.24	4.83	5.49
	F 153	5.99	8.41	8.91	7.77	15.58	13.99	9.50	13.02	2.91	4.16	4.16	3.74
	G. 74-96	8.49	7.56	11.83	9.29	11.16	11.74	13.16	12.02	4.16	5.25	3.66	4.35
Average		8.71	9.60	12.97	10.43	12.24	11.35	10.63	11.41	4.16	5.22	4.21	4.35
V x N	G.T 54-9	13.12	16.12	18.88	16.04	9.99	7.78	9.25	9.01	4.74	6.03	5.08	5.28
	F 153	7.99	10.74	11.87	10.20	11.95	10.95	8.83	10.58	2.95	5.20	5.49	4.55
	G. 74-96	8.45	10.44	13.37	10.75	9.74	8.66	10.28	9.56	4.20	4.74	3.12	4.02
Total Aver.		9.85	12.43	14.70	12.33	10.56	9.13	9.45	9.71	3.97	5.33	4.56	4.62

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	2.54	NS	NS
Nitrogen (N)	2.54	NS	NS
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N	NS		

the insignificant influence of irrigation system on the ER, it is clearly shown that the sufficient amount of water arround sugar cane plants speicially during the peak period of growth gave a relative advantage to drip irrigation system over furrow irrigation system which attained lesser ER than the drip irrigation system. The importance of sufficient water arround plant root system was reported by said Rahman, *el.*(1991).

Concerning the effect of nitrogen fertilizer on ER, it caused a signifcant and gradual increase in the ER as nitrogen levels increased up to 210 Kg/fed in both seasons at the periods of 240 and 300 days after planting which are considered the peak period of sugar cane growth where the profit rate from ecological elements i.e., water and nutrients is very high..

Once more, the highest elongation rates values were recorded when nitrogen fertilizer levels were between 180 and 210 Kg N/Fed. (Table 7and 8). It could be noticed that the ER of sugar cane stalks tended to decrease as the plant age increased. This results were in accordance with those shown by Abd -El-Gawad , *et al* (1992 -A).

With regared to varietal differneces there was a significant differences in elongarion rate between the three used varieties at 300 -360 days and 240-300 dayes in the first and second seasons respecively.However ,the highest value was attained by G.T.54-9 in both seasons.Both stem diamter andelongation were not significantly affected by the interaction of irrigation ,nitrogen and varieties.

4- Total soluble solids (TSS%):

Total soluble solids during growth season give a good information in respect to juice quality and maturity, also it could be considered an approximate measurement to the expected sugar recovery. Effect of

Table (9):Effect of irrigation systems and nitrogen fertilizer on total soluble solids% of some sugar cane varieties at different stages of growth(1992)

Tratmeents	Varieties	300 days Kg N./fed.			Aver.	360 days Kg N./fed.			Aver.	420 days Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	14.45	13.95	12.75	13.71	18.25	18.90	17.65	18.26	20.01	19.60	19.09	19.56
	F 153	16.00	15.00	15.35	15.45	19.75	19.05	18.15	18.98	20.10	19.62	19.20	19.64
	G. 74-96	17.45	14.40	14.65	15.50	20.25	19.50	20.15	19.96	21.70	21.10	21.05	21.28
Average		15.96	14.45	14.25	14.88	19.41	19.15	18.65	19.07	20.60	20.10	19.78	20.16
Furrow Irrigation	G.T 54-9	15.45	16.45	13.05	14.98	18.15	19.30	18.45	18.63	20.41	20.20	19.40	20.01
	F 153	14.60	13.90	17.95	14.15	18.55	18.65	18.70	18.65	21.30	20.95	20.45	20.90
	G. 74-96	16.50	17.80	15.75	16.68	19.85	19.50	19.00	19.45	21.00	21.30	20.00	20.76
Average		15.51	16.05	14.25	15.72	18.85	19.15	18.73	18.91	20.90	20.80	19.96	20.56
V x N	G.T 54-9	14.95	15.20	12.90	14.35	18.20	19.10	18.05	18.45	20.21	19.90	19.26	19.79
	F 153	15.30	14.45	14.65	14.80	19.15	18.85	18.45	18.81	20.70	20.28	19.82	20.27
	G. 74-96	16.97	16.10	15.20	16.09	20.05	19.50	19.57	19.70	21.35	21.20	20.52	21.02
Total Aver.		15.74	15.25	14.25	15.08	19.13	19.15	18.69	18.99	20.75	20.46	19.87	20.36

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	NS	0.68	0.74
Nitrogen (N)	NS	NS	NS
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N	NS	NS	

Table (10):Effect of irrigation systems and nitrogen fertilizer on total soluble solids% of some sugar cane varieties at different stages of growth(1993)

Treatments	Varieties	300 days Kg N./fed.			Aver.	360 days Kg N./fed.			Aver.	420 days Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	13.65	13.10	12.65	13.13	15.65	14.30	14.40	14.78	21.30	20.80	19.95	20.68
	F 153	15.65	15.10	13.65	14.80	17.90	16.60	15.05	16.51	22.30	21.30	20.15	21.25
	G. 74-96	16.80	15.45	14.80	15.68	18.95	17.30	16.15	17.46	22.30	22.30	21.80	22.13
Average		15.36	14.55	13.70	14.53	17.50	16.06	15.20	16.25	21.96	21.46	20.63	21.35
Surface Irrigation	G.T. 54-9	17.30	14.30	12.15	14.58	17.95	16.65	15.50	16.70	21.30	21.30	19.15	20.25
	F 153	16.30	17.30	16.10	16.56	18.80	18.50	17.45	18.25	22.30	22.00	20.30	21.53
	G. 74-96	16.95	15.15	14.80	15.63	19.95	16.80	15.95	17.56	21.50	21.00	20.30	20.93
Average		16.85	15.58	14.35	15.59	18.90	17.31	16.30	17.50	21.70	21.10	19.91	20.90
V x N	G.T 54-9	15.47	13.70	12.40	13.85	16.80	15.47	14.95	15.74	21.30	20.55	19.55	20.66
	F 153	15.97	16.20	14.87	15.68	18.35	17.55	16.25	17.38	22.30	21.65	20.22	21.39
	G. 74-96	16.87	15.30	14.80	15.65	19.45	17.05	16.05	17.51	21.90	21.65	21.05	21.53
Total Aver.		16.10	15.06	14.02	15.06	18.20	16.69	15.75	16.88	21.83	21.28	20.27	21.13

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	0.68	0.71	NS
Nitrogen (N)	0.68	0.71	NS
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N	NS	NS	NS

irrigation system and nitrogen fertilizer on TSS% of some sugar cane varieties at different growth stages is presented in Table (9 and 10). It could be observed that the influence of drip irrigation system on TSS% was as equal as surface irrigation and the difference between the two system was insignificant. In general, it seeme that water had no direct effect on TSS%. This result partially coinside with Patel and Joshi, *et al.* (1987) and Prasad, *et al.* (1991).

As for, the effect of nitrogen fertilizer on TSS%, the results appeared that TSS% responded negatively to the addional doses of nitrogen at 300 ,360 and 420 days in both seasons. However, the effect of nitrogen fertilizer on TSS% was significant only in the second season at 300 and 360days age.This result is in line with that found by Macalintal and Urgl (1990).

Once more, varietal differences in respect to TSS% are illustrated in Tables (9 and 10)G74 -96 variety attained (21.02, 21.53 followed by F153 (20.27, 21.39%) then G.T.54-9 (19.79, 20.66%) at 420 days in the first and second seasons,respectivelly. G74-96 variety attained a superiorty in TSS% over the other two varieties. These results were completely true under the various growth stages,with significant differences at 360 days and 420 days stage in the first season and 300 as well as 360 in the second one .It could be concluded that the tested varieties differed in their soluble solids percntage and G.74-96 variety was superior to the other two varieties in this respect. These results are in accordance with those found by ravindra, et al. (1989).

Generally, total soluble solids percentage is gentical affected by gen make up and nitrogen fertilizer, the lesser the nitrogen fertilizer dose the higher the total soluble solids (Tables 9 and 10).

5- Nitrogen percentage:

Results presented in Tables (11 and 12) show that irrigation systems had insignificant effect on nitrogen percentage of sugar cane leaf blades at all stages in the first and second seasons. Regardless the insignificant effect of irrigation systems on this character, drip irrigation attained little nitrogen content compared to the other one in both growing seasons.

As for the influence of nitrogen fertilizer on leaf blade nitrogen percentage, it could be declared that nitrogen application caused a signifiacnt increase in the values of nitrogen content of sugar cane leaf blade in the first season at 240 days age (Table (11). This result was fairly true under the various growth stages in the sesond seasons(Table 12). It could be noticed that increasing nitrogen doses up to 210 kg/ fed. increased nitrogen percentage in the leafe plade. These findings are in line with those reported by Kanwar, *et al.* (1991) and Ingawale, *et al.* (1992).

Concerning the varietal effect of the used varieties on nitrogen percentage in sugar cane leaf blades, results presented in Tables (12 and 13)reveal that there were insignificant differences betwen the different varieties in this trait at all growing periods in both seasons except at 420 days from planting in the first season.It is clear that increasing nitrogen levels casued a significant increase in the nitrogen content of leaf blade at the early stages of growth.

Table (11): Effect of irrigation systems and nitrogen fertilizer on nitrogen percentage of some sugar cane varieties at different stages of growth(1992)

Treatments	Varieties	240 days Kg N./fed.			Aver.	300 days Kg N./fed.			Aver.	420 days Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	1.250	1.250	1.300	1.267	1.000	1.200	1.200	1.133	0.925	0.650	1.050	0.875
	F 153	1.200	1.150	1.375	1.242	1.130	1.300	1.300	1.250	0.900	0.750	0.900	0.850
	G. 74-96	1.000	1.200	1.550	1.250	1.200	1.100	1.350	1.217	0.650	0.700	0.850	0.733
Average		1.150	1.200	1.408	1.253	1.117	1.200	1.283	1.200	0.825	0.700	0.933	0.819
Furrow Irrigation	G.T 54-9	1.200	1.3.75	1.400	1.325	1.250	1.300	1.300	1.283	0.900	0.875	0.900	0.892
	F 153	1.200	1.250	1.450	1.300	1.200	1.250	1.250	1.233	0.850	0.900	0.950	0.900
	G. 74-96	1.100	1.300	1.350	1.250	1.300	1.200	1.200	1.233	0.650	0.725	0.650	0.675
Average		1.167	1.308	1.400	1.292	1.250	1.250	1.250	1.250	0.800	0.835	0.833	0.822
V x N	G.T 54-9	1.225	1.317	1.350	1.296	1.125	1.250	1.250	1.208	0.913	0.763	0.975	0.883
	F 153	1.200	1.200	1.412	1.271	1.175	1.275	1.275	1.242	0.875	0.825	0.925	0.875
	G. 74-96	1.050	1.250	1.425	1.250	1.250	1.150	1.275	1.225	0.650	0.712	0.750	0.704
Total Aver.		1.158	1.254	1.404	1.272	1.183	1.225	1.267	1.225	0.813	0.767	0.883	0.821

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	NS	NS	0.094
Nitrogen (N)	0.127	NS	NS
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N	NS	NS	NS

Table (12): Effect of irrigation systems and nitrogen fertilizer on nitrogen percentage in leaf of some sugar cane varieties at different stages of growth(1993)

Treatments	Varieties	240 days Kg N./fed.			Aver.	300 days Kg N./fed.			Aver.	420 days Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	1.250	1.350	1.375	1.325	0.950	1.050	1.100	1.033	0.750	0.850	0.950	0.850
	F 153	1.200	1.325	1.600	1.375	1.000	1.050	1.200	1.083	0.700	0.950	0.950	0.867
	G. 74-96	1.250	1.250	1.550	11.342	1.050	0.900	1.250	1.067	0.650	0.825	0.800	0.758
Average		1.233	1.308	1.500	1.347	1.000	1.000	1.183	1.061	0.700	0.875	0.900	0.825
Furrow Irrigation	G.T 54-9	0.950	1.350	1.400	1.233	0.900	1.150	1.150	1.067	0.875	0.850	0.875	0.867
	F 153	1.050	1.325	1.500	1.292	0.950	0.950	1.150	1.017	0.820	0.750	0.950	0.840
	G. 74-96	1.100	1.350	1.350	1.267	1.050	1.200	1.150	1.133	0.825	0.875	1.000	0.900
Average		1.033	1.342	1.417	1.264	0.967	1.100	1.150	1.072	0.840	0.825	0.942	0.869
V x N	G.T 54-9	1.100	1.360	1.387	1.279	0.925	1.100	1.125	1.050	0.813	0.850	0.912	0.858
	F 153	1.125	1.325	1.550	1.333	0.975	1.000	1.175	1.050	0.760	0.850	0.950	0.853
	G. 74-96	1.175	1.300	1.437	1.304	1.050	1.050	1.200	1.100	0.737	0.850	0.900	0.829
Total Aver.		1.133	1.325	1.458	1.306	0.983	1.050	1.167	1.067	0.770	0.850	0.921	0.847

L.S.D at 5 % level:				
Irrigation (I)	NS	NS		NS
Varieties (V)	NS	NS		NS
Nitrogen (N)	0.171	0.115		0.079
I x V	NS	NS		NS
I x N	NS	NS		NS
V x N	NS	NS		NS
I x V x N				

It is was noticed that nitrogen percentage tended to decrease as the plant age increase up to maturity (Table 11 and 12). These results coincide with those reported by Nafei (1993) who mentioned that nitrogen content of plant tissue decreased descendingly as the plant grown older. Both total soluble solids and nitrogen persentage were not significantly affected by the interaction between the three studied factors.

II- Juice quality of sugar cane varieties stalks with relative to irrigation system and nitrogen fertilizer

1- Nitrogen percentage in cane stalk:

Results shown in Tables (13 and 14) indicate that there were no significant differences for the irrigation systems as well as nitrogen fertilizer or the used varieties on their effect on nitrogen content in the stalks of sugar cane plants in the first and second seasons. It is clear that there was no relation between nitrogen persentage and each of irrigation system, nitrogen fertilizer and cane varieties.

Despit the insignificant effect of the studied factors on this character, it is obvously shown that increasing nitrogen levels up to 210 Kg/fed slightly increased nitrogen percentage in cane stalks. Also, it is clear that F153 variety had the least values of nitrogen percentage in cane stalks compared to the other two varieties in both seasons.

The interaction between the three studied factors did not significantly affected nitrogen percentage in sugar cane stalk.

2- Brix percentage:

The results illustrated in Tables (13 and 14) show that Brix percentage responded insignificantly to irrigation systems. The results

Table (13): Effect of irrigation systems and nitrogen fertilizer on nitrogen,brix and reducing sugar percntage of some sugar cane varirties(1992)

Treatments	Varieties	Nitrogen % Kg N./fed.			Aver.	Brix % Kg N./fed.			Aver.	Reducing sugar % Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	0.600	0.550	0.700	0.617	24.02	23.01	22.65	23.22	1.610	1.620	1.870	1.630
	F 153	0.425	0.575	0.600	0.533	24.69	23.42	23.05	23.80	1.200	1.540	1.250	1.660
	G. 74-96	0.625	0.700	0.650	0.658	25.19	23.79	23.23	24.07	1.750	1.690	1.740	1.720
Average		0.550	0.608	0.650	0.603	24.63	23.40	23.06	23.70	1.520	1.610	1.890	1.670
Furrow Irrigation	G.T 54-9	0.600	0.575	0.700	0.625	23.68	22.64	23.08	23.13	1.630	1.790	1.890	1.800
	F 153	0.450	0.425	0.625	0.517	23.40	23.09	22.93	23.14	1.670	1.570	1.870	1.700
	G. 74-96	0.600	0.500	0.700	0.600	23.27	22.43	22.17	22.62	1.620	1.580	1.780	1.660
Average		0.550	0.517	0.675	0.581	23.45	22.72	22.73	22.96	1.640	1.650	1.880	1.720
V x N	G.T 54-9	0.600	0.563	0.700	0.621	23.85	22.83	22.86	23.18	1.620	1.700	1.830	1.700
	F 153	0.435	0.525	0.613	0.525	24.04	23.25	23.11	23.47	1.430	1.550	2.060	1.680
	G. 74-96	0.612	0.600	0.675	0.629	24.25	33.11	22.70	23.34	1.680	1.630	1.760	1.690
Total Aver.		0.550	0.563	0.663	0.592	24.04	23.06	22.89	23.33	1.580	1.630	1.890	1.700

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	NS	NS	NS
Nitrogen (N)	NS	NS	**NS**
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N	NS	NS	NS

Table (14): Effect of irrigation systems and nitrogen fertilizer on nitrogen,brix and reducing sugar percntage of some sugar cane varirties(1993)

Treatments	Varieties	Nitrogen % Kg N./fed.			Aver.	Brix % Kg N./fed.			Aver.	Reducing sugar % Kg N./fed.			Aver.
		150	180	210		150	180	210		150	180	210	
Drip Irrigation.	G.T 54-9	0.480	0.750	0.800	0.677	22.02	21.93	20.13	21.36	1.750	2.000	2.250	2.000
	F 153	0.500	0.600	0.600	0.567	22.63	21.17	20.39	21.39	1.550	1.830	2.270	1.980
	G. 74-96	0.675	0.550	0.825	0.683	22.68	22.35	20.63	21.89	1.910	2.070	2.220	2.070
Average		0.552	0.633	0.742	0.642	22.44	21.82	20.38	21.55	1.730	1.960	2.350	2.010
Furrow Irrigation	G.T 54-9	0.495	0.575	0.625	0.565	22.28	21.03	18.89	20.73	1.630	1.790	1.890	1.800
	F 153	0.600	0.600	0.650	0.617	20.96	20.54	19.53	20.34	1.970	2.130	2.550	2.220
	G. 74-96	0.575	0.500	0.675	0.583	22.41	22.54	19.78	21.58	1.970	2.050	2.370	2.130
Average		0.557	0.558	0.650	0.588	21.88	21.37	19.40	20.88	1.940	2.203	2.520	2.160
V x N	G.T 54-9	0.488	0.663	0.713	0.621	22.15	21.48	19.51	21.04	1.810	1.960	2.450	2.070
	F 153	0.550	0.600	0.625	0.592	21.79	20.85	19.96	20.87	1.760	1.980	2.560	2.100
	G. 74-96	0.625	0.525	0.750	0.633	22.54	22.45	22.20	21.73	1.940	2.060	2.300	2.100
Total Aver.		0.554	0.596	0.696	0.613	22.16	21.59	19.89	21.21	1.840	2.000	2.430	2.090

L.S.D at 5 % level:			
Irrigation (I)	NS	NS	NS
Varieties (V)	NS	NS	NS
Nitrogen (N)	NS	0.76	0.20
I x V	NS	NS	NS
I x N	NS	NS	NS
V x N	NS	NS	NS
I x V x N	NS	NS	NS

obtained pointed out that drip irrigation system somewhat raised sugar content in terms of brix percentage in both seasons. This obserevation was reported by Gupto and Sharama (1990).

Regarding the effect of nitrogen fertilizer on Brix percentage, the results show that increasing nitrogen doses from 150 to180 and 210 Kg/fed. significantly decreased Brix perecntage from 22.16% to 21.59% and 19.89%, respectively in the second season.

Regardless the insignificant effect of nitrogen rates on Brix percentage in the first season, Brix percentage values had the same trend as affected by nitrogen rates (24.04%, 23.06% and 22.89%). It could be concluded that increasing nitrogen application to sugar cane up 210 kg/fed. caused a reduction in sugar content. These findings are in line with those reported by Thomas and Scott (1990) and Abd El-Gawad *et al.* (1992-C).

The results show also that the differences between the used varieties did not reach the level of significance in their effect on Brix percentage.

It is clear that the three studied varieties slightly differed in their sugar content.

3- Reducing sugar percentage (RS%):

Data presented in Tables (13 and 14) revealed that there was no significant response for RS% due to irrigation systems. However, sugar cane plants grown under drip irrigation produced lesser RS% compared to those under the furrow irrigation. The presented results are in harmony with Gupta and Sharma (1990).

Concerning the effect of nitrogen fertilizer on the RS%, the results clear that RS% was insignificantly affected by the added nitrogen rates in

the first season. On the other hand reducing sugar percentages were increased significantly by application of nitrogen doses up to (150,180 and 210) Kg/fed. respectivelly. These results are in agreement with those found by Ingawale, *et al.* (1992).

As for the varietal effect on RS%, there was insignificant effect on RS% due to the used varieties. However, variety F153 recorded the least RS% . It could be conculded that F153 was superior to the other two studied varieties concerning sugar quality.

4- Sucrose percentage :

Data presented in Tables (15 and 16) show that the regular providing of water supply through the drip irrigation system has succeeded to attain an advantage in respect to sucrose percentage over those under the traditional method of irrigation i.e. furrow irrigation. In spite of the increase in sucrose percentage under drip irrigation system which amounted to (0.67% and 0.84%) than those under furrow irrigation in the first and second seasons, respectively., This increment was not great enough to reach the level of significance. This result is in agreement with Gary Gasho (1985).

Concerning nitrogen fertilizer there was a reverse and significant relationship between the additional doses of nitrogen and sucrose percentage in juice of sugar cane plants in both seasons. These results were completly true with the different sugar cane varieties. Increasing nitrogen fertilizer from 150 to 210 Kg/fed. reduced sucrose percentage from20.52 and 17.78% to 19.25 and 15.46% in the first and second season respectively. These findings are in hormony with Abd El-Gawad, e*t al.* (1992-C). The reduction in the percentage of sucrose with the increase in

Table (15): Effect of irrigation systems and nitrogen fertilizer on sucrose and fiber percentage of some sugar cane varieties at harvest(1992)

Treatments	varieties	Surose% Kg.N/fed			Average	Fiber% Kg.N/fed			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	20.67	19.72	19.29	19.89	12.00	12.65	12.60	12.41
	F 153	21.83	20.15	19.59	20.52	12.90	13.00	13.30	13.06
	G 74-96	21.13	19.86	19.72	20.23	12.25	12.55	12.60	12.36
Average		21.06	19.91	19.53	20.21	12.38	12.63	12.83	12.61
Furrow irrig	G.T54-9	20.11	19.84	19.06	19.67	11.90	12.35	12.40	12.21
	F153	19.78	19.65	19.21	19.55	13.00	13.40	13.75	13.38
	G74-96	20.08	19.51	18.65	19.41	12.25	12.40	12.80	12.48
Average		19.99	19.66	18.97	19.54	12.38	12.71	12.98	12.69
V XN	G.t 54-9	20.39	19.78	19.17	19.78	11.95	12.50	12.50	12.31
	F 153	20.58	19.90	19.40	19.46	12.95	13.20	13.50	13.22
	G.74- 96	20.60	19.68	19.18	19.82	12.25	12.32	12.70	12.42
Total average		20.52	19.78	19.25	19.85	12.38	12.67	12.90	12.65

L .S .D at 5% Level		NS
Irrigation (I)	= NS	0·14
Varieties (V)	=NS	0.14
Nitrogen (N)	= 0.62	NS
IXV	=NS	0.20
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	

Table (16): Effect of irrigation systems and nitrogen fertilizer on sucrose and fiber percentage of some sugar cane varieties at harvest(1993)

Treatments	varieties	Surose% Kg.N/fed			Average	Fiber% Kg.N/fed			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	18.01	17.41	16..37	17.26	12.12	12.15	13.50	12.25
	F 153	18.79	17.04	15.79	17.21	13.00	13.25	12.47	13.24
	G 74-96	18.15	18.37	15.38	17.30	12.25	12.25	12.40	12.30
Average		18.31	17.61	15.85	17.25	12.45	12.55	12.79	12.60
Furrow irrig	G.T54-9	17.36	16.60	14.91	16.29	12.10	12.40	12.50	12.33
	F153	16.65	15.93	14.43	15.67	13.30	13.20	13.70	13.40
	G74-96	17.74	18.15	15.90	17.26	12.10	11.97	12.70	12.25
Average		17.25	16.89	15.08	16.41	12.50	12.52	12.96	12.66
V XN	G.t 54-9	17.69	17.00	15.64	16.78	12.11	12.27	12.50	12.29
	F 153	17.72	16.48	15.11	16.44	13.15	13.22	13.58	13.32
	G.74- 96	17.94	18.26	15.64	17.28	12.17	12.11	12.55	12.27
Total average		17.78	17.25	15.46	16.83	12.47	12.53	12.87	12.63

L .S .D at 5% Level		NS
Irrigation (I)	= NS	0·22
Varieties (V)	=NS	0.22
Nitrogen (N)	= 1.06	NS
IXV	=NS	NS
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	

nitrogen level may be due to the enhancing role of N. fertilizer to the vegetative growth than sugar accumlation which contributed to the increase in R.S % (Tables 13 and 14) and the decrease in sucrose % (Tables 15 and 16). It could be concluded that increasing nitrogen doses to sugar cane plants reduced sucrose percentage in its juice.

Regarding the varietial effect on sucrose%, results in Tables (15 and 16) show that there was no significant differences between the used varieties in their content of sucrose.

Sucrose percentage in sugar cane juice was not significantly affect the interaction between irrigation system, varieties and nitrogen levels.

5- Fiber percentage:

Effect of irrigation systems and nitrogen fertilizer on fiber percentage of sugar cane stalks for some sugar cane varieties is presented in Table (15 and 16).

The results collected indicate that the two irrigation systems had no significant effect on this character in both growing seasons. It could be noticed that there was no pertenance between irrigation system and their percentage in sugar cane plant.

As to varietal influence on this parameter, it was noticed that fiber percentage was significantly affected by varieties in first and second season where F153 variety gave the highest values of fiber percentage (13.22% and 13.32%) in the two seasons respectively.

Table (17) : Effect of irrigation systems and nitrogen fertilizer on Purity percentage and recovery percentage of some sugar cane varieties at harvest(1992)

Treatments	varieties	Purity% Kg.N/fed			Average	Recovery% KgN/fed			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	86.05	85.37	85.14	85.52	12.67	12.45	12.27	12.46
	F 153	86.52	86.09	84.44	85.68	12.74	12.55	12.51	12.60
	G 74-96	83.82	83.60	84.85	84.09	12.75	12.53	11.96	12.41
Average		85.46	85.02	84.81	85.10	12.72	12.51	12.24	12.49
Furrow irrig	G.T54-9	85.08	83.89	82.78	83.92	13.12	12.55	12.53	12.73
	F153	84.54	85.96	84.21	84.90	12.07	12.61	12.32	12.33
	G74-96	86.35	87.75	84.63	86.24	12.18	12.26	11.61	12.01
Average		85.32	85.87	83.87	85.02	12.45	12.47	12.15	12.36
V XN	G.t 54-9	85.56	84.63	83.96	84.72	12.89	12.50	12.40	12.60
	F 153	85.53	86.03	84.32	85.29	12.40	12.58	12.41	12.46
	G.74- 96	85.08	85.68	84.74	85.17	12.46	12.40	11.79	12.21
Total average		85.39	85.44	84.34	85.06	12.59	12.49	12.20	12.42

L .S .D at 5% Level

Irrigation (I)	= NS	NS
Varieties (V)	=NS	NS
Nitrogen (N)	=NS	NS
IXV	=NS	NS
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	NS

Table (18) : Effect of irrigation systems and nitrogen fertilizers on purity percentage and recovery percentage of some sugar cane varieties at harvest (1993)

Treatments	varieties	Purity% Kg.N/fed			Average	Recovery% Kg N/fed			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	80.50	78.85	79.35	79.60	11.00	10.27	9.94	10.40
	F 153	83.52	80.48	76.00	80.00	11.60	10.17	9.19	10.32
	G 74-96	79.74	82.31	75.50	79.18	11.23	11.49	8.74	10.48
Average		81.25	80.58	76.95	79.59	11.28	10.64	9.29	10.40
Furrow irrig	G.T54-9	77.90	78.59	79.34	78.61	10.33	10.26	9.62	10.07
	F153	79.40	80.05	73.65	77.70	9.80	9.85	8.92	9.53
	G74-96	80.90	80.64	76.55	79.36	10.90	11.13	9.16	10.40
Average		79.40	79.76	76.51	78.55	10.34	10.41	9.23	9.99
V XN	G.t 54-9	79.70	78.77	79.34	79.10	10.66	10.26	9.78	10.23
	F 153	81.84	80.26	74.82	78.85	10.70	10.01	9.05	9.92
	G.74- 96	80.32	81.47	76.02	79.27	11.06	11.31	8.95	10.44
Total average		80.32	80.17	76.73	79.07	10.81	10.53	9.26	10.20

L .S .D at 5% Level		
Irrigation (I)	= NS	NS
Varieties (V)	=NS	NS
Nitrogen (N)	=2.78	0.85
IXV	=NS	NS
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	NS

first season and (76.73%) in the second season . This result is in line with Yaduvanshi, *et al.*, (1990).

Because of purity percentage basically depends upon the values of sucrose and brix percenatge, lowering the values of purity as a result of increased N-application may be due to its effect on sucrose and/or brix percentage. These observations were explained by Mohamed (1989) who mantioned that the decrease in purity percentage dependes on sucrose and brix values.

(Purity%= sucrose%/brix%) in which the increase in purity may be due to the increase in sucrose and/or to the decrease in brix and vice versa.

It could be concluded that the increased doses of nitrogen to sugar cane plants reduced purity of juice.

The effect of interaction between irrigation system, varieties and nitrogen levels on juice purity was not significantl in the two seasons.

7- Sugar recovery percenatge:

Tables (18 and 19) point out that sugar recovery was not significantly influenced by varieties or irrigation systems in the first and second seasons.

Once more, nitrogen application attained a statistical negative influence on sugar recovery percentage in the second season. Increasing nitrogen levels from 150 up to 210 Kg/fed. reduced sugar recovery percentage. The lowest rate of nitrogen (150 Kg/fed) produced the highest

sugar recovery percenatge (12.59%) in the first season and (10.81%) in the second one.

The fruitful effect of the lower dose of nitrogen on sugar recovery is manily due to its effect on sucrose% (Tables 15 and 16) and purity% (Tables 18 and 19). These results are in agreement with Mohamed (1989) who cleared that the trend of sugar recovery was similar to sucrose percenatge, hence increasing N-levels decreased sucrose and consequently sugar recovery.

Sugar recovery percentage was not significantly affected by the interaction between the three studied factors in both seasons.

III YIELD AND YIELD COMPONENTS OF SOME SUGAR CANE VARIETIES WITH RELATION TO IRRIGATION SYSTEMS AND NITROGEN FERTILIZER

1- Number of millable cane:

Millable canes represent the actual plants which grow enough to reach maturity stage. Number of millable canes at harvest give a real view to the expected cane yield.

Results presented in Tables (19 and 20) show the influence of irrigation, nitrogen doses and varieties on number of millable cane.

Concerning irrigation effect on number of millable cane, drip irrigation surpassed that of furrow irrigation by 3768 stalk/fed. in the first season. On the other hand drip irrigation was inferior to furrow one by

Table (19): Effect of irrigation systems and nitrogen fertilizer on number of millable cane of some sugar cane varieties at harvest(1992)

Treatments	Varieties	Number of millable cane/fed			Average
		kgN/fed.			
		150	180	210	
Drip Irrigation	G.T.54-9	58242	60526	67092	61668
	F153	65094	67949	68234	67092
	G.74-96	79230	63095	62810	61600
Averag		61097	63952	65665	63723
Furrow Irrigation	G.T.54-9	58242	53103	59384	56529
	F153	65665	68520	66236	66800
	G.74-96	55101	57385	56243	55958
Average		59382	95669	60583	59955
VxN	G.T.54-9	58356	56928	62810	59498
	F153	65379	67949	67206	66807
	G.74-96	57671	60240	59498	58813
Total average		60488	61607	62810	61668

L.S.D at 5 % Lvel	
Irrigation (I)	NS
Varieties (V)	NS
Nitrogen (N)	NS
IxV	NS
IxN	NS
VxN	NS
IxVxN	NS

Table (20): Effect of irrigation systems and nitrogen fetilizer on number of millable cane of some sugar cane varieties at harvest(1993)

Treatments	Varieties	Number of millable cane/fed.			Average
		kg N/fed.			
		150	180	210	
Drip Irrigation	G.T.54-9	58242	63381	62810	61668
	F153	69662	64230	68520	70804
	G.74-96	57671	67378	63452	62810
Averag		62239	68520	65094	65139
Furrow Irrigation	G.T.54-9	59955	55384	62810	59384
	F153	67348	71446	75943	71500
	G.74-96	63952	73659	74230	70804
Average		63381	66807	70906	67378
VxN	G.T.54-9	59584	59500	62720	60526
	F153	68748	73088	71946	71375
	G.74-96	61097	70233	59091	66807
Total average		62810	67378	67949	66499

L.S.D at 5% Level

Irrigation (I)	NS
Varieties (V)	6268
Nitrogen (N)	NS
IxV	NS
IxN	NS
VxN	NS
IxVxN	NS

2239 stalk/fed. in the second one. However, the differnce between the two irrigation system was not signficant.

With regard to nitrogen levels, increasing nitrogen dose from 150 up to 210 Kg/fed. increased the malliable cane from 60488 to 62810 stalk/fed. in 1992 and from 62810 to 67949 stalk/fed. Without significant differences between different levels of nitrogen in both seasons. Tables (19 and 20).

On the other hand Abd El-Latif *et al.*, (1993) found that number of millable cane significantly raised as the applied doses of nitrogen increased up to 240 Kg N/fed. at the first season and 210 Kg N/fed. at the second season.

Results in Tables (19 and 20) reveal that the three studied varieties differed in the number of millable cane/fed. The difference between them were significantly in the second season.

F.153 variety was superior to the other two, namely G.T. 54-9 and G. 74-96 with about 7309 and 7994 stalk/fed. respectively in the first season and 10849 and 4568 stalk/fed. in the second one.

The relative advantage of F. 153 variety in respect to number of millable cane may be explained that millable cane number is mainly affected by gen make up. It is also worth mentioning that the superiority of this variety in relation to this character may be due to the relative cabability of this variety (F. 153) to produce more tiller than the other two varieties (Table 1 and 2). The importance of gen action on millable cane and the quantitative creteria has been written by Abd El- Latif, et al.,

Table (22): Effect of irrigation systems and nitrogen fertilizer on cane and sugar yieldof some sugar cane varieties(1993)

Treatments	varieties	Cane yeild\tons Kg.N/fed			Average	Sugar yeild-tons Kg.N/fed			Average
		150	180	210		150	180	210	
Drip irrig.	G.T.54-9	49.20	58.25	60.75	56.06	5.39	5.97	6.00	5.79
	F 153	41.50	47.00	56.15	48.26	4.76	4.78	5.16	4.90
	G 74-96	40.05	45..00	50.25	45.10	4.50	5.50	4.56	4.85
Average		43.58	50.08	55.71	49.79	4.88	5.42	5.24	5.18
Furrow irrig	G.T54-9	43.50	48.50	25.20	50.06	4.24	4.93	5.53	4.90
	F153	37.80	44.60	45.47	42.62	3.73	4.39	4.03	4.05
	G74-96	39.50	44.25	48.75	44.16	4.27	4.92	4.28	4.49
Average		40.26	45.78	50.80	45.61	4.08	4.75	4.61	4.48
V XN	G.t 54-9	46.35	53.37	59.47	53.06	4.82	5.45	5.76	5.34
	F 153	39.65	45.80	50.81	45.42	4.24	4.58	4.60	4.47
	G.74- 96	39.77	44.62	49.50	44.63	4.39	5.21	4.42	4.67
Total average		41.92	47.93	53.26	47.70	4.48	5.08	4.93	4.830

L .S .D at 5% Level		
Irrigation (I)	= NS	NS
Varieties (V)	=3.23	0.38
Nitrogen (N)	=3.23	0.38
IXV	=NS	NS
IXN	=NS	NS
VXN	=NS	NS
IXVXN	= NS	NS

Prasad, *et al.* (1991), Yadav and Singh (1991) and Abd El-Gawad,*et al.* (1992).

As to the effect of gen make up i.e. varieties it could be noticed wide and statistical differences between varieties in their stalk yield. Sugar cane variety G.T. 54-9 registered the highest cane yield (48.72 and 53.06 tons/fed.) followed by F. 153 (45.03 and 45.42 tons/fed.) and G. 74-96 varieties (43.01 and 44.63 tons/fed.) in the first and second seasons, respectively. This finding throw some light on the importance of gen make up i.e. varietal selection.

In spite of sugar cane variety G.T. 54-9 produced lowest number of millable cane compared with the other two varieties (Tables 19 and 20) it succeeded to produce the highest yield of stalk; this result may be due to the high weight of the individual plant of this variety. This observation coincide with those found by Nafi (1993) who showed that sugar cane variety viz G.T. 54-9 producced the highest cane yield and sugar over G. 68-88 variety.

3- Sugar yield (tons/fed.):

Sugar yield in terms of sucrose is the final product for all the agronomical and biochemical reaction in plant tissue. Sugar yield is affected by two wings i.e. stalk yield and sugar recovery of cane juice.

Results obtained in Tables (21 and 22) appeared no insignificant response in sugar yield due to irrigation systems in both growing seasons.

Regardless the insignifcant effect of irrigation systems on sugar yield, it could be noticed that drip irrigation slightly improved sugar yield.

comapred to furrow irrigation in both seasons. These findings are in line with those shown by Shrestha and Gopalakrishman (1993).

Belonging the effect of nitrogen fertilizer on sugar yield, the obtained results revealed that there was a gradual and significant increase in sugar yield in both seasons . Applying nitrogen at the rates of 150 , 180 and 210 Kg/fed. attained sugar yield of , 5.20, 5.70 and 5.89 tons/fed. in the first season as well as 4.48, 5.08 and 4.93 tons/fed. in the second season respectively. It could be noticed that the highest sugar yield in the second season was obtained by the application of 180 Kg N/fed. without significant difference between 180 and 210 Kg N/fed.

The increase in sugar yield due to increasing nitrogen levels is in accordance with those reported by Kanwar, *et al.* (1991), Abd El-Gawad, *et al.* (1992) and Abd El-Hady, *et al.* (1994).

Concerning the varietal effect on sugar yield. It is obviously shown that sugar cane variety G.T. 54-9 attained a superiority in sugar yield over the other two varieties in the second season. This advantage for G.T. 54-9 variety is due to its superiority in stalk yield.

It surpassed F.153 by 0.30 ton in the first season and both F.153 and G. 74-96 by 0.87 and 0.67 ton/fed. respectively in the second season.

SUMMARY

Two field experiments were conducted at El_Mataana Station (Qena governorate) in two successive seasons of 1992 and 1993 to evaluate the relative effect of some irrigation systems (Drip and Furrow irrigation) and nitrogen fertilizer (150, 180 and 210 Kg N/fed.) on the qualitative and quantitative properties of three sugar cane varieties (G.T. 54-9, F. 153 and G. 74-96).

The obtained results could be summarized as follows:

1- Irrigation systems and/or the used varieties had no significant effect on the number of tillers /m. there was a tendency to the increae in number of tillers as nitrogen dose increased up to 210kg/fed.However,the differences between nitrogen levels failed to reach the level of significance in their effect on this character at 120 days age.

2- Drip irrigation system surpassed the furrow irrigation in stalk height by 5.3% and 5% at harvest in the first and second season, respectively.

There was a significant and gradual increase in stalk height by increasing doses of nitrogen fertilizer up to 210 Kg N/fed in the first season. Meanwhile, nitrogen fertilizer had no significant influence on stalk height in the second season at harvest.

Variety G.T. 54-9 attained a significant superiority in respect to plant height over the other two varieties followed by F.153 at harvest in the first and second season .Plant heighet was significantly affected by the interaction between variety and irrigation at 360 days age in both seasons and at harvesr in the first one.