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EFFECT OF DELIVERY DELAY ON QUALITY PARAMETERS OF SOME SUGARCANE VARIETIES UNDER DRIP AND SURFACE IRRIGATION

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Abstract

This work was carried out in Upper Egypt at El-Mattana Agricultural Research Station, Qena Governorate in two successive seasons (1996/1997 and 1997/1998) to study the effect of delivery delaying processes on quality parameters of some sugar cane vrieties after cutting. Each trail included the combination between two irrigation systems (drip and furrow) and three sugarcane varieties (G.T. 54-9, F. 153 and G.74-97). The results showed that stalk weight losses and reducing sugar percentages of sugar percentages of sugarcane stalks tended to increases as can stalks delivery delayed up to 7 days after cutting. On the contrary, the exracted juice, sucrose and purity percentages decreased as the period after cane cutting was prolonged. Weight losses, extracted juice, sucrose and purity percentages were significantly affected by the irrigation systems. The highest quality parameters in terms of sucrose and purity were produced under drip irrigation. Reducing sugar percentage was insignificantly affected by irrigation systems. Varietal difference were signifcant in respect to the studied traits. Sugarcane variety G.T. 54-9 recorded highest values of extracted juice, brix and purity percentages over the other two varieties. Curve analysis and partial regression analysis indicated that the effect of delivery depends on the quality parameter. In some cases, it was found to be positive (weight losses% and reducing sugar %) in others, it was found to be negative (Purity% and extracted juice%) while in some cases no clear relation was observed, (sucrose % and brix %). In some cases, interaction was existent i.e weight losses% and reducing sugar for stalks. In other cases interaction was not existent i.e extracted juice%, sucrose% and purity. The interaction between irrigation systems and sugarcane varieties did not affecte sucrose percentage significantly in both seasons except in the 6th and 7th days in the first season only.

INTRODUCTION

Water is an essential reagent for hydrolytic-process. For digestion of starch to sugar, five percent of water is utilized for the physiochemical functions of which less than one percent of the absorbed water is utilized chemically in photosynthesis. Concerning cane delivery to sugar mill, no consideration is give to cane quality as

cane is purshased on weight basis only. The insufficient means of transportations cause a delay in cane delivery to the mill, which leads to piling of the harvested canes in the fields for long durations and in turn a decline in cane weight and a deterioration in juice quality. Irvine and Legendre (1974) observed serveral differences in the deterioration rates of five commercial varieties. They obtained no significant changes in brix, sucrose or purity up to 6 days after harvest. Wood (1976) showed that rate of decline in purity and recoverable sugar tended to increase with the decrease in stalk length, while reducing sugars showed a corresponding increase. Ingram (1983) resported that using drip irrigation with sugar cane plants increased sugar yield. George (1985) found that the excess water in cane field caused a reduction in sucrose and purity percentage in sugar cane. lenendre (1985) milled cane stalks at 0, 3, 7, 10, 14, and 17 days after harvest. He found that the rate and extent of deterioration as measured by changes in sucrose content, purity or sugar yield were difficult to detect. Bludau *et al.* (1990) found that billets of sugarcane produced by the cane harvester can be stored for 1-3 weeks without sugar losses whereas chopped materials has to be processed immediately after harvest. Choudhary. 1991 harvested five high energy sorghum genotypes (HES2, HES3, HES4, HES6, HES13) and crushed them after delays up to 4 days. He found that brix at harvest was the highest (17.0) in HES13 and the lowest (9.7) in HES3; weight loss (average of all storage periods) was lowest (5.12%) for HES13 and highest (8.98%) for HES3. He added that over the 4-day period, weight loss averaged 15.73%, average juice yield decreased from 41.7 to 37.6% and average brix increased from 14.4 to 18.0 Nour El-Hoda *et al* (1995) found that when some sweet sorhum varieties were stored after harvest, juice extraction, purity% and sucrose% were decreased, while the values of, Rs% and T.S.S% were increased. The present work aims at studying the effect of delaying delivery proccess of the harvested cane on juice quality of three sugar cane varieties grown under drip or furrow irrigation.

MATERIALS AND METHODS

This investegation was carried out in Upper Egypt at El-Mattana Agricultural Research Station, Qena Governorate in two successive seasons of 1996/1997 and 1997/1998 to study the effect of delaying delivery proccess of the harvested cane on juice quility of three sugar cane varieties grown under drip or furrow irrigation.

This study included six treatments which were the combination between two irrigation systems (drip and furrow) and three sugarcane varieties (G.T. 54/9,

F.153 and G.74/96). A split plot design with four replications was used. Irrigation systems were allocated in the main plots while cane varieties were randomly distributed in the sub plots. The meterological data of Qena Governorate from 1st-10th March in 1997 and 1998 were recorded as shown in table (1).

Table 1. The meterological data of Qena Governorate from 1st-10th March in 1997 and 1998.

Days	Temperture C		Humidity %	
	1997	1998	1997	1998
1 st	20.3	21.0	47.1	44.2
2 nd	20.8	21.5	45.1	43.7
3 rd	21.0	22.3	40.2	42.0
4 th	20.5	22.8	41.0	40.0
5 th	22.0	23.1	39.6	38.6
6 th	24.0	25.0	37.0	35.2
7 th	24.3	25.6	37.8	36.0
8 th	25.4	26.8	35.0	32.0
9 th	26.0	25.0	34.5	33.1
10 th	26.2	26.4	32.0	30.0

At harvest a sample of 25-stalk was taken at random for each treatment. The harvested stalks were topped, hand cleaned and left in the open air outside the mill.

Recorded data:

The following parmaneters were daily determind up to 7 days.

1. weight losses (%) in fresh weight of cane stalks.
2. Cane juice extracted %.
3. Brix/100 cm3 of juice was determined in the laborotary using brix hydrometer standared.
4. Sucrose/100 cm3 of juice was determined using sacharemeter according to AOAC (1995).
5. Purity percentage was calculated according to the following equation:

Purity % = Sucrose % x 100/Brix %.

6. Reducing sugar percentage was determined in the extracted juice of cane according to chemical control in Egyptian production factories (Anonymous, 1981).

Statistical analysis:

The collected data were subjected to proper statistical analysis of split plot

design according to Snedecor and Cochran (1981). Partial regression analysis was carried out according to Steel and Torrie (1987). Curve analysis as applied by Cuthbert and Wood (1971).

RESULTS AND DISCUSSION

1. Effect of Delay :

1.1. Weight losses percentage;

Delaying sugarcane delivery after cutting continuously increased weight losses percentage of sugarcane stalks.

Regarding the effect of irrigation systems on weight losses of canes, the results revealed that this trait was significantly affected by the used irrigation systems after 3, 6 and 7 days from harvesting in the first season. Also, it could be observd that the weight losses of sugarcane plants grown under drip irrigation system were less than that under the furrow one. This finding may be due to that plant grown under surface irrigation system produced more jucey stalk than those grown under drip irrigation. Consequnetly most of loss in stalk weight of sugarcane grown under surface irrigation was mainly due the loss in moisture content of the juicey stalks. (Table 2 and Fig. 1).

Concerning the weight losses of the different sugarcane varieties, it could be noticed that G.T. 54-9 variety suffered the highest losses percentage (21.33%) in stalk weight loss compared with the other two sugarcane varieties i.e., F153 and G.74-96 (14.10% and 16.03%) respectively in the second season. Also, the results showed a significant effect of the used varieties on this trait after 4 and 7 days from cutting in the second season. These results are in general agreement with those repoted by Irvine and Legendre (1974).

As for the effect of the interaction between the stuied factors on the weight losses percentage of sugarcane stalks, the results cleared that this trait was insignificantly affected by the interaction between the studied factors in the first and second season. Menwhile the interaction between irrigation x varieties affected the weight losses percentage significantly in fourth and seventh days from harvest in second season.

1.2. Extraced Juice Percentage:

The collected data in Table (3) and Fig. (2) cleared that extracted juice perce-

Table 2. Effect of delivery delay on weight losses percentage of sugarcane stalks after harvest in 1996/1997 and 1997/1998 growing seasons.

Treatments	days after harvesting															
	at harvest		1		2		3		4		5		6		7	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Irrigation																
Drip (A1)	--	--	3.43	2.75	6.20	4.69	9.70	6.83	14.81	10.30	15.12	11.78	16.92	11.63	20.00	15.48
Surface (A2)	--	--	3.75	4.07	5.80	6.24	6.94	9.22	12.12	10.96	17.63	13.07	19.45	15.04	21.15	18.83
L.S.D at 0.05	--	--	NS	NS	NS	NS	2.66	1.61	NS	NS	NS	NS	NS	1.94	NS	1.97
Varieties																
C9 (B1)	-	--	3.56	3.43	5.69	5.50	8.64	7.51	14.80	9.92	15.82	11.90	19.47	14.18	19.07	21.33
F153 (B2)	----	--	3.42	3.38	5.50	5.60	9.32	8.80	14.89	13.09	16.33	12.14	61.61	13.05	20.97	14.10
G. 74-96 (B3)	--	--	3.79	3.41	6.82	5.29	7.05	7.77	16.71	8.80	16.99	13.23	18.47	12.82	20.37	16.03
L.S.D. at 0.05	--	--	NS	NS	NS	NS	NS	NS	NS	2.26	NS	NS	NS	NS	NS	2.41
A1 x B1	--	--	3.39	3.08	6.21	4.5	9.77	6.50	15.15	9.87	15.99	12.34	18.35	14.03	19.03	22.10
A1 x B2	--	--	2.72	2.04	6.22	4.61	11.66	7.60	15.59	13.19	14.92	10.22	16.38	10.19	19.97	11.76
A1 x B3	--	--	4.19	3.12	6.18	5.40	7.67	6.40	13.69	7.84	14.46	12.79	16.03	10.67	21.05	12.57
A2 x B1	--	--	3.73	3.78	5.17	6.96	7.51	8.53	14.45	9.97	15.64	11.47	20.59	14.33	19.11	20.56
A2 x B2	--	--	4.12	4.73	4.78	6.60	6.99	10.00	14.19	13.00	17.74	14.07	16.85	15.81	21.93	16.44
A2 x B3	--	--	3.39	3.70	7.46	5.17	6.34	9.14	19.00	9.91	19.51	13.67	20.91	14.98	22.41	19.48
L.S.D. at 0.05	--	--	NS	NS	NS	NS	NS	NS	NS	3.20	NS	NS	NS	NS	NS	3.41

centage was significantly affected by the studied irrigation systems viz drip and furrow irrigation after 2 and 7 days and (3, 4 and 6 days) after harvest of sugarcane stalks in the first and second seasons, respectively.

It could be observed that values of extracted juice percentage were generally higher under drip irrigation than those under surface one. Also, it was noticed that extracted juice percentage tended to decrease as deleivery sugarcane delay was increased up to 7 days after cutting. These results are in line with those found by Choudhary (1990) who harvested five high energy sorghum genotypes (HES2, HES3, HES4, HES6, HES13) and crushed them after delays up to 4 days. He found that juice yield was decreased from 41.7 to 37.6%.

Significant varietial different in respect to the percentage of the extracted juice were obtained only in the second season after 0, 4, 6, and 7 days from harvest. Sugarcane variety G.T.54-9 produced mostly higher values of the extracted juice percentage compared with the other two varieties.

The collected data in Table (3) revealed that extracted juice percentage was insignificantly affected by the ineraction between the studied factors.

1.3. Brix percentage:

No clear cut trend in the vlaues of brix of cane juice could be detected due to delaying of delivery cane stalks after harvest.

The results obtained in Table (4) and Fig. (3) cleared that brix percentage of cane stalks was significantly responded to the applicable irrigation systems in the second season after the 2, 3, 5, 6, and 7 days from cutting. However, this trait was not affected significantly by the irrigation sytems in the first season. These results are in accordance with those obtained by Irvine and Legendre (1974).

Concering the effect of the sugarcane varieties on brix percentage, it could be noticed that brix percentage was significantly affected by the sugarcane varieties in the second season. Variety G.T. 54-9 surpassed the other two varieties in respect to brix percentage. These results are in agreement with those reported by Choudhary (1990).

The collected data in Table (4) showed that the effect of the interaction between the studied factores did not reach the level of sgnificanc in their effect, on brix percentage except at the fourth days after harvest in the first season and the sixth day in the second one.

Table 3. Effect of delivery delay on extracted juice percentage of sugarcane stalks after harvest in 1996/1997 and 1997/1998 growing seasons.

Treatments	days after harvesting															
	at harvest		1		2		3		4		5		6		7	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Irrigation																
Drip (A1)	71.96	73.85	71.50	73.40	70.79	71.91	69.77	69.74	55.11	67.09	53.55	62.26	52.03	57.25	49.77	53.18
Surface (A2)	71.90	74.50	70.82	73.91	68.63	71.48	69.53	67.96	55.16	64.74	51.64	61.47	46.55	55.30	44.46	51.87
L.S.D. (0.05)	N.S.	N.S.	N.S.	N.S.	2.12	N.S.	N.S.	1.51	N.S.	0.75	N.S.	N.S.	N.S.	1.76	1.54	N.S.
Varieties																
C9 (B1)	72.37	75.78	71.64	74.67	68.58	72.77	68.99	69.03	57.95	66.33	52.29	62.06	49.25	57.92	47.39	55.20
F153 (B2)	73.55	74.62	71.19	74.45	69.01	72.21	69.46	69.37	53.34	65.85	54.24	62.93	46.94	56.35	47.33	52.50
G. 74-96 (B3)	70.65	72.13	69.88	71.85	71.54	70.11	70.51	68.15	54.13	64.93	51.24	60.15	51.69	54.57	46.63	49.88
L.S.D. (0.05)	N.S.	2.01	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.89	N.S.	N.S.	N.S.	2.15	N.S.	1.61
A1 x B1	74.27	75.66	72.83	74.57	71.05	71.97	70.22	69.81	59.96	68.33	54.77	62.72	49.75	58.97	49.17	55.73
A1 x B2	72.44	74.90	70.82	75.53	68.14	73.70	68.38	70.87	53.01	66.90	54.35	61.62	52.11	56.67	51.77	53.00
A1 x B3	69.19	71.01	70.86	70.53	73.19	70.07	70.78	68.55	52.38	66.05	51.55	62.26	54.25	56.12	48.37	50.82
A2 x B1	70.48	75.90	70.45	74.77	66.11	73.57	67.76	68.25	55.95	65.60	49.81	61.41	48.75	56.87	45.67	54.67
A2 x B2	74.67	74.35	71.56	73.80	69.88	70.72	70.54	67.87	53.67	64.81	54.14	64.25	41.77	56.02	42.89	52.00
A2 x B3	70.57	73.25	70.45	73.17	69.90	70.15	70.30	67.76	55.88	63.82	50.97	58.77	49.14	53.02	44.89	48.95
L.S.D.	N.S.	N.S.	N.S.	N.S.	3.66	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	2.66	N.S.

Table 4. Effect of delivery delay on brix percentage of sugarcane stalks after harvest in 1996/1997 and 1997/1998 growing seasons.

Treatments	days after harvesting															
	at harvest		1		2		3		4		5		6		7	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Irrigation																
Drip (A1)	23.67	20.12	24.20	20.39	24.58	21.25	25.01	21.65	25.39	22.46	26.04	23.03	26.31	23.41	26.71	24.01
Surface (A2)	23.86	19.80	24.02	20.04	24.45	20.49	24.89	21.00	25.23	21.61	25.54	22.13	26.03	22.55	26.41	22.96
L.S.D (0.05)	NS	NS	NS	NS	NS	0.61	NS	0.57	NS	0.46	NS	0.21	NS	0.25	NS	0.43
Varieties																
C9 (B1)	23.11	20.83	24.10	20.82	24.52	21.71	25.02	22.07	25.31	22.62	26.00	23.05	26.46	23.37	26.84	23.95
F153 (B2)	24.21	19.34	23.63	19.85	24.17	20.32	24.66	20.95	25.30	21.80	25.69	22.37	25.93	22.72	26.32	23.05
G. 74-96 (B3)	23.97	19.72	24.31	19.97	24.85	20.57	24.96	21.00	25.25	21.70	25.69	22.32	26.12	22.85	26.52	23.47
L.S.D. (0.05)	NS	0.64	NS	NS	NS	0.75	NS	0.71	NS	0.571	NS	0.28	NS	0.32	NS	0.50
A1 x B1	23.48	21.13	24.20	20.82	24.40	22.35	25.09	22.60	25.50	23.30	26.26	23.85	26.56	23.95	26.83	24.00
A1 x B2	23.24	19.07	23.87	19.94	24.35	20.50	24.85	21.00	25.22	22.00	25.83	22.55	26.00	23.05	26.56	23.45
A1 x B3	24.28	20.17	24.54	20.40	24.98	20.90	25.08	21.35	25.25	22.10	26.05	22.70	26.36	23.25	26.74	24.10
A2 x B1	22.74	20.53	24.22	20.82	24.64	21.08	24.95	21.45	25.25	21.95	25.74	22.25	26.36	22.80	26.86	23.40
A2 x B2	25.19	19.62	23.40	19.76	23.99	20.15	24.88	20.90	25.38	21.60	25.56	22.20	25.85	22.40	26.08	22.65
A2 x B3	23.66	19.26	24.07	19.54	24.71	20.25	24.84	20.65	25.05	21.30	25.32	21.95	25.89	22.45	26.30	22.85
L.S.D (0.05)	NS	NS	NS	NS	NS	NS	1.61	NS	NS	NS	NS	0.43	NS	NS	NS	NS

Table 5. Effect of delivery delay on sucrose percentage of sugarcane stalks after harvest in 1996/1997 and 1997/1998 growing seasons .

Treatments	days after harvesting															
	at harvest		1		2		3		4		5		6		7	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Irrigation																
	20.62	17.23	20.46	16.93	20.17	16.63	18.71	16.04	18.95	15.62	18.53	14.96	17.97	14.15	16.80	13.15
Surface (A2)	20.58	16.50	20.17	15.94	19.85	15.28	19.33	14.51	18.90	13.65	18.46	12.75	17.72	11.81	16.68	10.66
L.S.D (0.05)	NS	NS	NS	NS	NS	0.82	NS	1.07	NS	0.71	NS	0.71	NS	0.86	NS	0.89
Varieties																
C9 (B1)	20.54	16.61	20.46	16.28	20.10	15.87	19.65	15.46	19.11	14.88	18.59	14.20	17.99	13.37	16.75	12.30
F153 (B2)	20.21	15.55	20.02	15.02	19.65	14.55	19.19	13.50	18.74	12.85	18.36	12.10	17.64	11.27	16.60	10.27
G. 74-96 (B3)	21.04	18.43	20.48	17.95	20.28	17.45	18.22	16.87	18.97	16.17	18.60	15.27	17.83	14.30	16.86	13.15
L.S.D. (0.05)	N.S.	1.04	N.S.	1.22	N.S.	1.00	N.S.	1.33	N.S.	0.89	N.S.	0.89	N.S.	0.89	N.S.	1.11
A1 x B1	20.19	16.90	20.54	16.72	20.20	16.55	19.69	16.47	19.16	16.22	18.81	15.55	18.14	14.80	17.05	13.70
A1 x B2	20.67	16.26	20.54	15.92	20.13	15.45	19.59	14.15	19.00	13.70	18.61	13.00	18.14	12.20	16.95	11.35
A1 x B3	21.01	18.52	20.31	18.15	20.18	17.90	16.86	17.50	18.69	16.95	18.30	16.35	17.50	15.45	16.40	14.40
A2 x B1	20.90	16.32	20.37	15.85	20.00	15.20	19.61	14.45	19.07	13.55	18.37	12.85	17.85	11.95	16.46	10.90
A2 x B2	19.76	14.84	19.50	14.22	19.17	13.65	18.79	12.85	18.48	12.00	18.11	11.20	17.15	10.35	16.25	9.20
A2 x B3	21.08	18.35	20.64	17.75	20.39	17.00	19.58	16.25	19.16	15.00	18.90	14.20	18.12	13.15	17.32	11.90
L.S.D. (0.05)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.46	N.S.	0.93	N.S.

Table 6. Effect of delivery delay on purity percentage of sugarcane stalks after harvest in 1996/1997 and 1997/1998 growing seasons .

Treatments	days after harvesting															
	at harvest		1		2		3		4		5		6		7	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Irrigation																
Drip (A1)	85.60	85.66	84.91	83.00	84.52	78.31	84.97	74.51	83.73	69.52	83.22	65.05	83.00	60.75	82.17	54.96
Surface (A2)	85.84	83.18	83.33	79.72	83.48	74.60	83.40	69.15	82.84	64.45	82.83	57.96	82.17	52.30	81.18	64.58
L.S.D. (0.05)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	1.07	N.S.	3.70	N.S.	3.05	N.S.	3.02	N.S.	4.13
Varieties																
C9 (B1)	86.32	79.70	85.79	78.22	85.07	73.12	84.55	70.07	84.78	67.58	83.89	61.43	83.61	57.00	81.53	51.35
F153 (B2)	85.96	80.44	86.36	76.04	84.31	71.57	84.23	65.12	83.84	58.90	83.38	54.35	82.24	50.20	81.26	45.07
G. 74-96 (B3)	84.43	93.12	84.33	89.80	84.13	84.67	82.77	80.30	82.33	74.47	82.97	68.75	82.05	62.37	82.25	55.90
L.S.D. (0.05)	1.11	5.57	N.S.	5.50	2.41	5.86	N.S.	1.33	N.S.	4.53	N.S.	3.71	N.S.	3.72	N.S.	5.07
A1 x B1	85.37	79.96	83.62	80.40	84.56	74.10	83.90	72.85	83.81	69.61	83.34	65.16	83.16	61.80	80.38	56.15
A1 x B2	86.66	85.28	86.05	79.75	84.65	75.35	84.50	68.75	83.49	62.30	83.98	58.00	83.81	54.00	81.10	49.00
A1 x B3	84.78	91.75	84.46	88.85	87.36	85.50	83.13	81.95	82.47	76.65	84.35	72.00	82.66	66.45	82.03	59.75
A2 x B1	87.27	79.45	79.97	76.05	83.58	72.15	83.10	67.30	84.33	65.55	83.22	57.70	82.95	52.20	82.67	46.55
A2 x B2	85.27	75.60	86.67	72.33	83.97	67.80	84.60	61.50	82.19	55.50	83.78	50.70	80.30	46.40	81.42	41.15
A2 x B3	84.09	94.50	84.21	90.80	82.91	83.85	82.40	78.65	82.00	72.30	80.60	65.50		58.30	79.40	
L.S.D. (0.05)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	3.20	N.S.

1.4. Sucrose percentage:

The results obtained in Table (5) revealed that sucrose percentage of sugarcane stalks was gradually decreased as the period between harvest and cane delivery was prolonged. Also, it was noticed that the values of sucrose percentage were generally higher in the first season compared with those of the second one.

Regarding the effect of irrigation systems, it could be observed that sucrose percentage was significantly responded to irrigation system only in the second season after the 2 nd days of harvest up to the end of the examined period (7 days). Sucrose percentage generally recorded higher value under drip irrigation system compared with surface irrigation (Table 5 and Gig. 4). This finding could be due to the fact that lower moisture content the higher concentration of total soluble solids in terms of sucrose.

Regarding varietal effect on sucrose percentage, the collected results showed that the studied varieties broadly affected sucrose percentage. This effect was only statistically significant in the secod seasons. Regardless the significant effect of varieties on this trait, it was obviously seen that sugarcane variety G. 74-96 was superior over the other two varieties followed by G.T. 54-9 then F.153 variety. This result is in line with reported by Irvine and Legender (1974) and Nour El-Hoda *et al.* (1995).

Sucrose percentage was not significantly affected by the interaction between the irrigation x sugaecane varieties except at 6 and 7 days after cutting of cane stalks in the first seasons.

1.5. Purity percentage:

Data in Table (6) showed that purity percentage was markedly decreased as the delivery of the harvested cane stalks was delayed up 1st to 7th days.

It was noticed that purity percentage attained higher values under drip irrigation system as shown in Fig (5). Those results may be due to the regular providing of water supply to cane stalks under the drip irrigation system throughout the growing season where cane plants produced higher values of sucrose percentage compared with those obtained under furrow irrigation system. Moreover, the effect of the used irrigation systems was significant only in. the second season after 3-7 days from cutting.

Significant differences among the examined sugarcane varieties were recorded in respect to purity percentage of cane juice in the first season and at the 1st and the second day after harvest in the second season. Sugar cane variety G.41.96 produced mostly higher values of purity percentage particulary in the first season followed by G. T.54-9 and F. 153 which recorded the lowest purity percentages specially in the second season. These results are in agreement with those found by Irvine and Legendre (1974) and Nour El-Hoda *et al.* (1995).

Purity percentage was insignificantly affected by the interaction among the studied factors in both seasons except at 7 days after cane cutting in the first season.

1.6. Reducing sugar percentage:

Data presented in Table (7) showed that reducing sugar percentage increased by prolonging the period after cutting. It could be noticed that cane stalks grown under under drip irrigation system mostly produced lower values of reducing sugar percentage than under surface irrigation (Fig. 6). This result canbe accepted due to the fact that the lower the reducing sugar percentage the higher the quality characters in terms of extracted juice, sucrose, and purity percentages (Tables 2, 4 and and 5, respectively).

Sugarcane variety F.153 produced the highest values of reducing sugar percentage compared with the other two varieties.

Reducing sugar percentage was insignificantly affected by the interation between the studied factors in the first season. Meanwhile, this trait was significantly influenced by the interaction between the studied factors at the third, fourth, fifth and six days after cutting.

2. Curve analysis:

Usual analysis of variance "ANOVA" show that there is no sigificant difference between the invistigated factors with few exceptions (Table 2 to 7). However the general trend from harvest to the seventh day was clear enough, so curve analysis was used instead with ANOVA to invistigate the effect of delivery delay on quality parameters. The significance of general trend was tested over the invistigated factors i.e. irrigation and cultivars.

Data are graphically represented in Figures (7 to 12) for quality parameters

Table 7. Effect of delivery delay on reducing sucrose percentage of sugarcane stalks after harvest in 1996/1997 and 1997/1998 growing seasons .

Treatments	days after harvesting															
	at harvest		1		2		3		4		5		6		7	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Irrigation																
Drip (A1)	1.46	2.31	2.10	2.51	2.02	3.00	3.55	3.32	3.23	3.75	3.51	4.13	3.22	4.53	3.95	5.16
Surface (A2)	1.61	2.49	1.97	2.63	2.21	2.24	2.24	3.50	3.53	3.86	4.00	3.30	3.75	4.78	4.23	5.36
L.S.D (0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Varieties																
C9 (B1)	1.82	2.65	1.86	2.67	2.18	3.07	2.30	3.33	3.45	3.65	2.90	4.27	3.20	4.65	4.26	5.57
F153 (B2)	1.61	2.70	1.90	2.95	1.93	3.35	2.67	3.87	2.73	4.30	5.45	4.77	3.19	5.30	4.31	5.80
G. 74-96 (B3)	1.27	1.85	2.17	2.10	2.52	2.62	3.72	3.02	3.00	3.47	2.51	3.60	3.28	4.02	3.69	4.42
L.S.D (0.05)	0.28	0.28	NS	0.32	NS	0.25	NS	NS	NS	0.39	NS	0.43	NS	0.43	NS	0.17
A1 x B1	1.73	2.30	1.81	2.40	2.05	2.80	2.34	3.02	4.09	3.30	2.70	3.95	3.15	4.30	4.02	5.40
A1 x B2	1.40	2.60	2.26	3.00	1.55	3.50	3.29	4.00	2.95	4.55	2.27	5.00	3.39	5.35	4.41	5.80
A1 x B3	1.26	1.84	2.22	2.15	2.45	2.70	4.01	2.95	3.14	3.40	2.55	3.45	3.13	3.95	3.41	4.30
A2 x B1	1.91	2.80	1.91	2.95	2.30	3.35	2.26	3.65	4.22	4.00	3.10	4.60	3.26	5.00	4.50	5.75
A2 x B2	1.66	2.80	1.55	2.90	2.30	3.20	2.05	3.75	2.52	4.05	5.64	4.55	3.00	5.25	4.22	5.80
A2 x B3	1.28	1.87	2.13	2.05	2.04	2.55	2.45	3.10	2.85	3.55	3.27	3.75	3.42	4.10	3.97	4.55
L.S.D. (0.05)	NS	NS	NS	NS	NS	0.39	NS	0.43	NS	0.57	NS	0.61	NS	NS	NS	NS

of sugarcane stalks i.e. weight losses% in fresh weight, extracted cane juice%, brix% of sugarcane stalks, sucrose%, purity% and reducing sugar% of sugarcane stalks, explaining the three factors interaction between irrigation systems, cultivars and years explaining the three factors interaction between irrigation systems, cultivars and years.

The weight losses from harvest to the 7th day for drip irrigation in 1996 season is given in Sub figure (a), for surface irrigation in 1996 season in Sub figure (b).

The two corresponding figures for 1997 season are given in Sub figures c and d. Examining Figure (7) a, b, c and d, it was found that weight losses % for stalks of sugarcane increases gradually from harvest to the 7th day for irrigation system. Cultivars were found to be different from each other starting from the 3th day. However, years and irrigation systems are of different performane.

These results indicated that year x cultivar x irrigation interaction is not clear enough.

Examining Figure (8) a, b, c and d, it was found that the situation is completely different for the extracted juice, an inverse relationship between days and extracted juice was observed. There is no interaction between irrigation, cultivars and years; the Sub figures (a, b,c and d), were found to be of the same trend. For brix% Figure, 9 a, b,c and d, showed positive constant increase from harvest to the 7th day over cultivars, irrigation and years. Interaction is not observed enought.

Examining Figure (10, a, b, c and d), for sucrose %, the only difference that can be observed is between cultivars in Sub figurs c and d, the 3 factor interaction would seem to be clear enough. Figure (11, a, b, c and d) for purity % of cane stalks showed that, the trend is not clear in 1996 season, while it was clear enough in 1997 season. Negative relation was observed between days and purity. Cultivars are different from each other. The three factor interaction is existent for reducing sugar % (Figure 12, a, b, c and d), However cultivars were found to be different. Reducing sugar% increased from harvest to the 7th days.

3. Partial regression analysis:

Examining results given in Table (8), it was found that the relationship between weight losses% and reducing sugar% over days are positively significant,

while for extracted juice%, sucrose% over purity% over days are negatively significant, for brix% and days was not significant.

Table 8. Partial regression coefficient and the corresponding probability at significant level.

	X	BX / D	Probability	Significance
1	Weight losses%	2.6575	0.0000	**
2	Extracted juice%	- 3.6895	0.0000	**
3	Brix%	0.2613	0.4330	N.S
4	Sucrose%	- 0.6160	0.0000	**
5	Purity%	- 2.2990	0.0090	**
6	Reducing sugar%	0.3764	0.0000	**

** Significant at 0.01
N.S : Not Significant

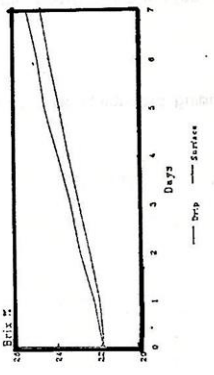

Fig. 3. Brix percentage of sugarcane stalks after harvest over growing seasons.

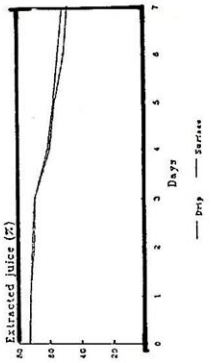

Fig. 2. Extracted juice Percentage of sugarcane stalks after harvest over growing seasons.

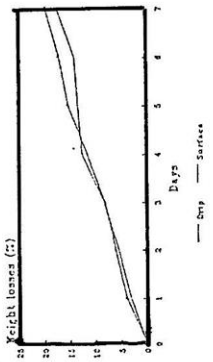

Fig. 1. Weight losses of sugarcane talks after harvest over growing seasons.

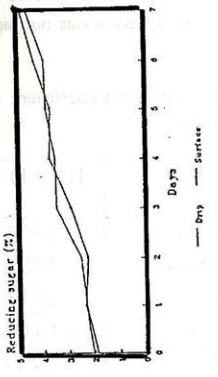

Fig. 6. Reducing sugar percantage of sugarcane stalks after harvest over growing seasons.

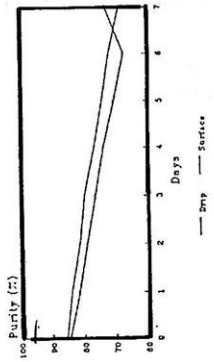

Fig. 5. Purity percentage of sugarcane stalks after harvest over growing seasons.

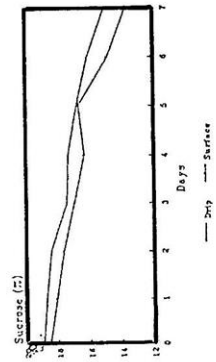

Fig. 4. Sucrose percentage of sugarcane stalks after harvest over growing seasons.

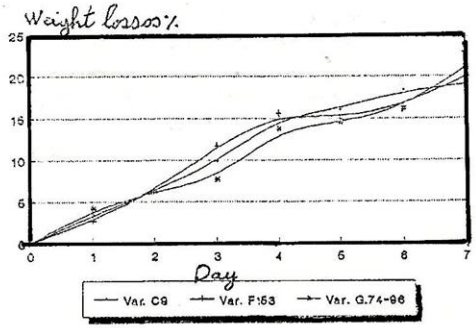

Fig. 7a. Weight losses of sugarcane stalks (Dripx Varieties (1996).

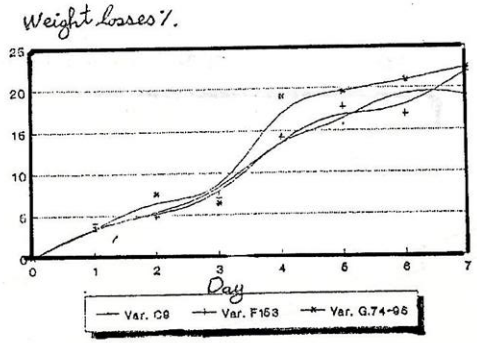

Fig. 7b. Weight losses % of sugarcane stalks (surfacex Varieties (1996).

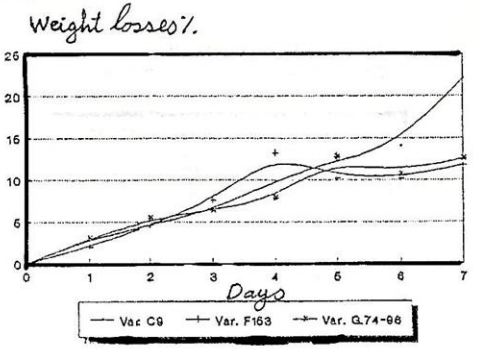

Fig. 7c. Weight losses of sugarcane stalks (Dripx Varieties (1997).

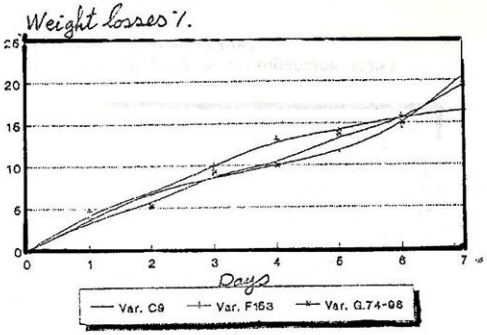

Fig. 7d. Weight losses % of sugarcane stalks (surfacex Varieties (1997).

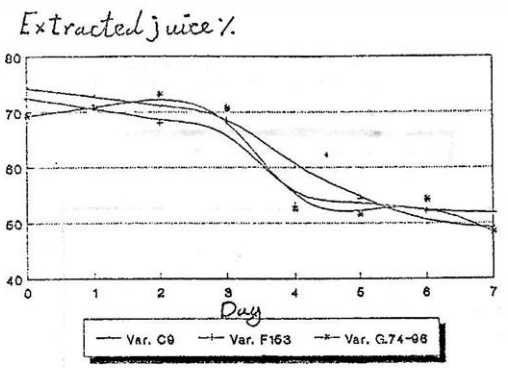

Fig. 8a. Extracted juice % of sugarcane stalks (Dripx Varieties (1996).

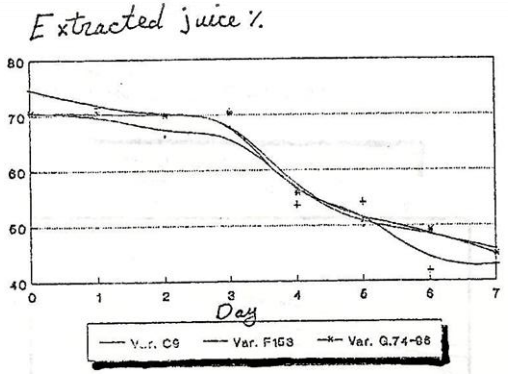

Fig. 8b. Extracted juice % of sugarcane stalks (surfacex Varieties (1996).

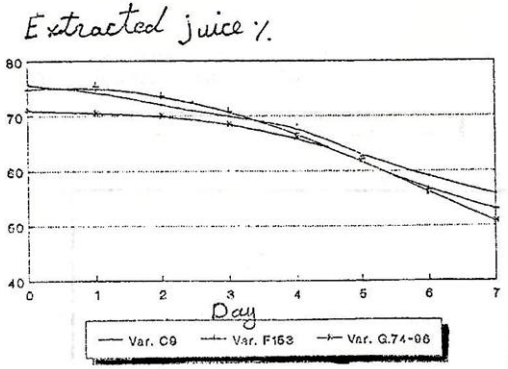

Fig. 8c. Extracted juice % of sugarcane stalks (Dripx Varieties (1997).

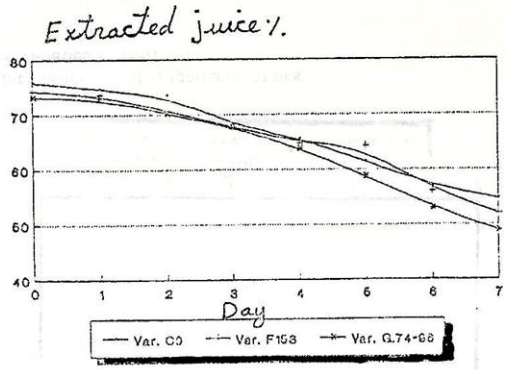

Fig. 8d. Extracted juice % of sugarcane stalks (Surfacex Varieties (1997).

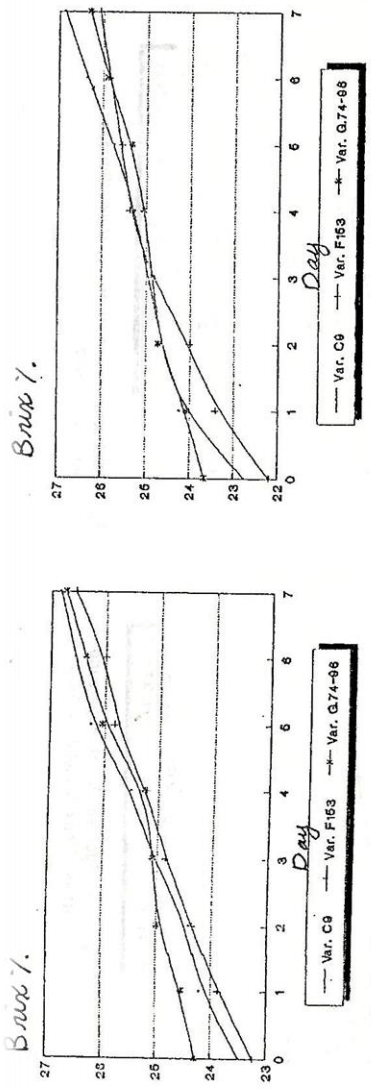

Fig. 9a. Brix % of sugarcane stalks (Dripx Varieties (1996).

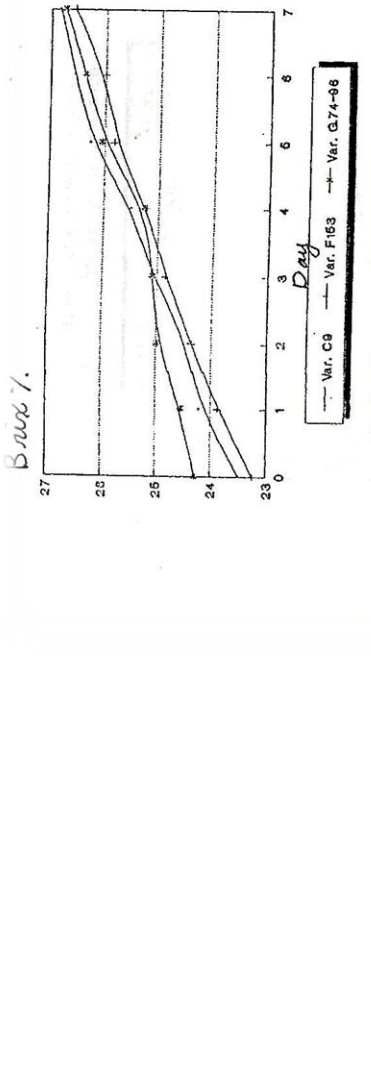

Fig. 9.b. Brix % of sugarcane stalks (Surface x Varieties (1996).

Fig. 9c. Brix % of sugarcane stalks (Dripx Varieties (1997).

Fig. 9d. Brix % of sugarcane stalks (Surfacex Varieties (1997).

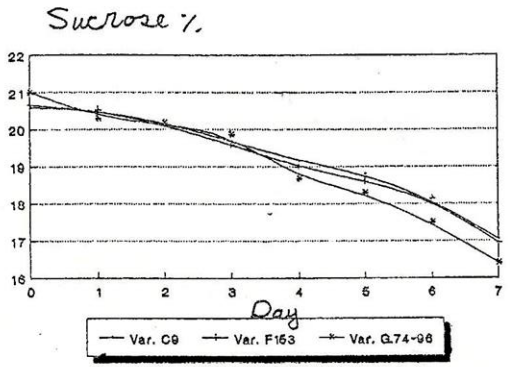

Fig. 10a. Sucrose % of sugarcane stalks (Dripx Varieties (1996).

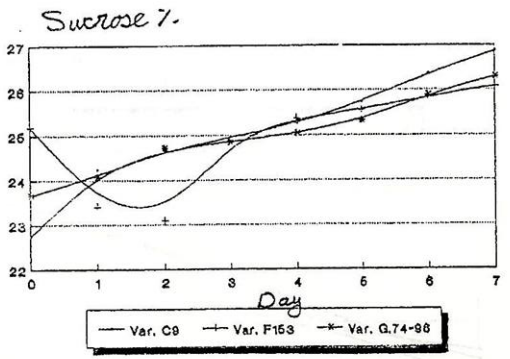

Fig. 10.b. Sucrose % of sugarcane stalks (Surfacex Varieties (1996).

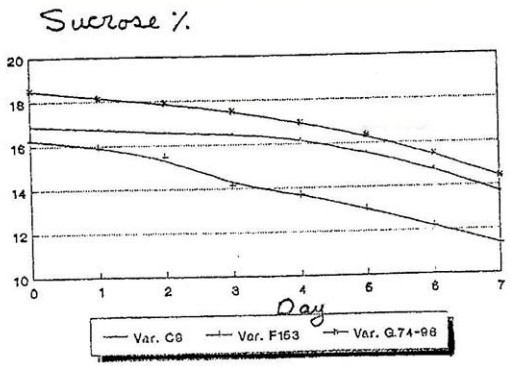

Fig. 10c. Sucrose % of sugarcane stalks (Dripx Varieties (1997).

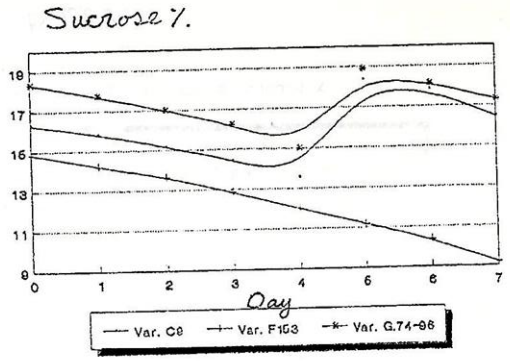

Fig. 10d. Sucrose % of sugarcane stalks (Surfacex Varieties (1997).

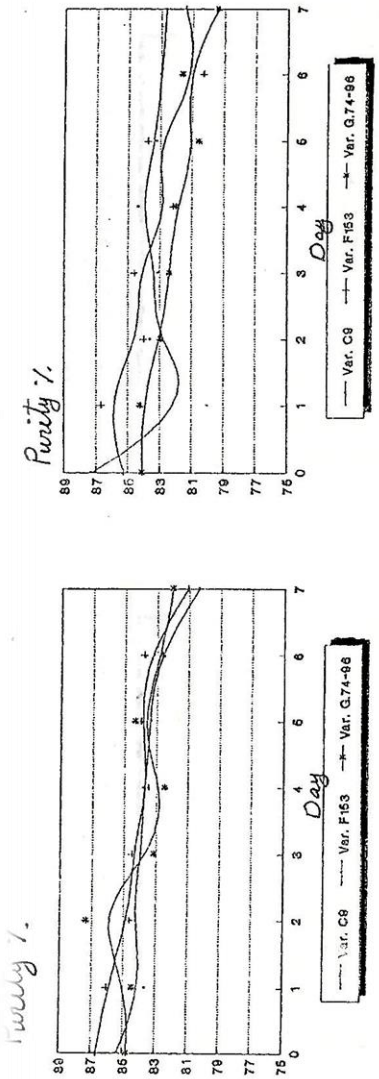

Fig. 11a. Purity % of sugarcane stalks (Drip x Varieties (1996).

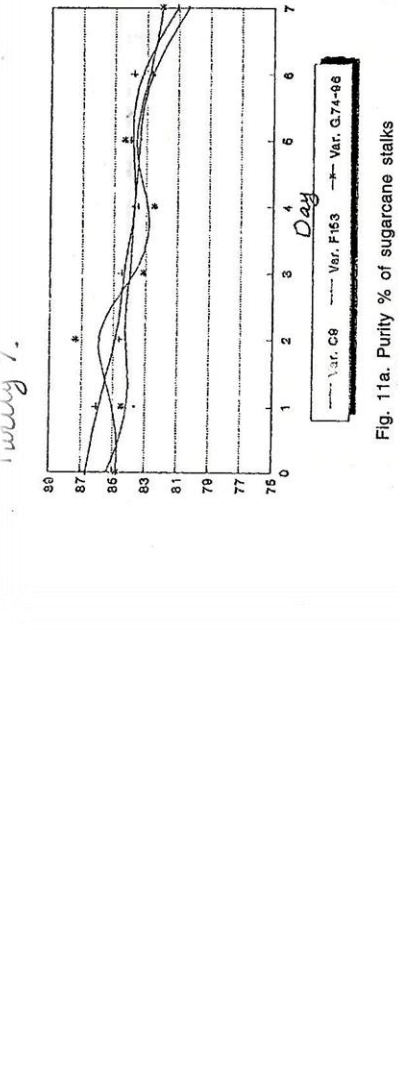

Fig. 11b. Purity % of sugarcane stalks (Surface x Varieties (1996).

Fig. 11c. Purity % of sugarcane stalks (Drip x Varieties (1997).

Fig. 11d. Purity % of sugarcane stalks (Surface x Varieties (1997).

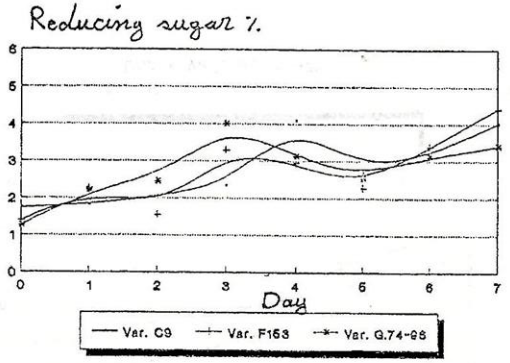

Fig. 12a. Reducing sugar % of sugarcane (Dripx Varieties (1996).

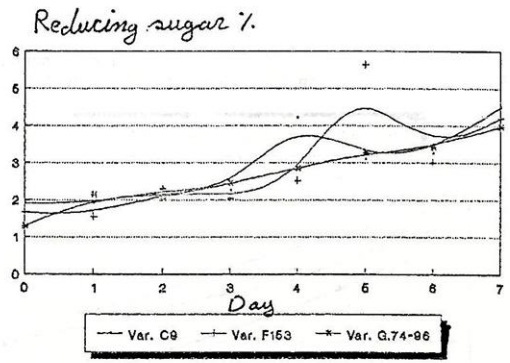

Fig. 12.b. Reducing sugar % of sugarcane stalks (surfacex Varieties (1996).

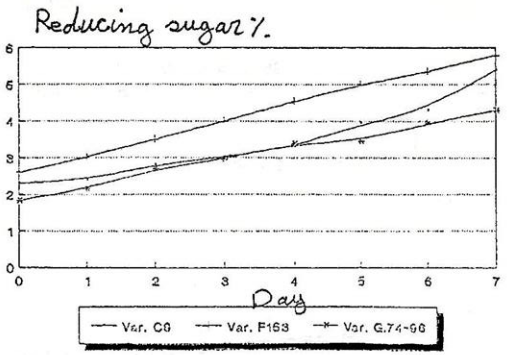

Fig. 12c. Reducing sugar % of sugarcane stalks (Dripx Varieties (1997).

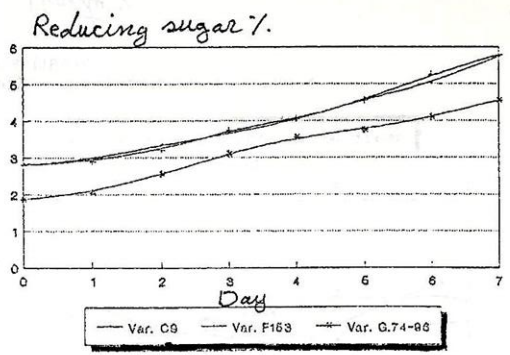

Fig. 12d. Reducing sugar % of sugarcane stalks (Surfacex Varieties (1997).

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تأثير تاخير التوريد علي مقاييس الجودة لبعض اصناف قصب السكر

ناصر بخيت عزازي١، نجدي عبد العليم محمد٢، إبراهيم حنفي الجداوي١

١ معهد بحوث المحاصيل السكريه. المعمل المركزي لبحوث التصميم والتحليل الأحصائي – مركز البحوث الزراعية – الجيزه – مصر.

إجري هذا البحث بمحطة بحوث المطاعنة محافظة قنا بمنطقة مصر العليا خلال موسمي الزراعة ١٩٩٦ عصير ١٩٩٧ و ١٩٩٧ عصير ١٩٩٨ وذلك بغرض دراسة تاخير توريد القصب بعد الكسر علي صفات الجودة لبعض اصناف قصب السكر – وقد اشتملت التجربة علي ٦ معاملات هما نظامين للري (الري بالتقيط والري السطحي التقليدي) وثلاثة اصناف لقصب السكر (جيزة تايوان ٥٤ – ٩ واف ١٥٣ وجيزه ٧٤ – ٩٦) وقد أظهرت النتائج مايلي.

١ – أدي زيادة تاخير توريد القصب الي المصنع حتي ٧ ايام بعد الكسر الي زيادة كل من النسبة المئوية للفقد في وزن عيدان القصب والنسبة المئوية للسكريات المختزلة – بينما أنخفضت كل من النسبة المئوية للعصير المستخلص والسكروز والنقاوة.

٢. تأثرت كل من النسبة المئوية للفقد في الوزن والعصير المستخلص والسكروز والنقاوة معنويا بنظم الري المستخدمة حيث ادي استخدام نظام الري بالتنقيط الي الحصول علي افضل النتائج لصفات الجودة (النسبة المئوية للسكروز والنقاوة) – بينما لم تتاثر معنويا النسبة المئوية للسكريات المختزلة.

٣. اختلفت الاصناف المستخدمة معنويا في معظم الصفات المدروسة – وقد تفوق الصنف جيزة تايوان ٥٤ – ٩ في صفة كل من النسبة المئوية للعصير المستخلص والبركس والنقاوة عن الصنفين الاخريين.

٤. لا يوجد تاثير معنوي للتفاعل بين نظم الري والاصناف علي النسبة المئوية للسكروز في كلا الموسمين عدا في اليوم السادس والسابع في الموسم الاول فقط.

٥. أظهر تحليل المنحنيات أن تأخير توريد القصب علي صفات الجودة كان في بعض الحالات موجبا ومعنويا (النسبة المئوية للفقد في الوزن والسكر) بينما كان التأثير في البعض الاخر سالبا (النسبة المئوية للنقاوة والعصير المستخلص) وفي حالات أخري لم تكن العلاقات واضحة.