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Response of Sugar Beet to Planting Dates and Water Requirements in Middle Egypt 2-Yield and Yield Components

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TWO FIELD experiments were carried out for two growing seasons of sugar beet 1995 / 1996 and 1996/1997 at Sids Agric. Res. Station Farm Beni-Suef Governorate, Egypt to study the relationship between planting dates (25 Sept., 10 Oct. and 25 Oct.) and irrigation treatments (irrigation at 40 , 60 and 80% depletion from available soil moisture added to recommend irrigation). Significant increases in root length, root diameter, fresh root weight , leaves number / plant, fresh weight / plant were obtained by early planting date at all ages in both seasons . At harvest the highest values of root length, root diameter and yield of roots, tops and sugar / fed were obtained by early planting (25 Sep.), while. the heaviest roots were obtained from middle planting date (10 Oct.). On the other hand , late planting gave the highest number of plants / fed. Total soluble solids (T.S.S.), sucrose percentage and purity were significantly increased by early planting date in both seasons.

Irrigation at 40 % depletion from available soil moisture resulted in the highest values of all growth characters except root length , yield and yield components and all quality characters under study.

Early planting date with irrgatioion at 40% depletion from available soil moisture gave the highest values of all characters under study.

Keywords: Sugar beet, Panting dates, Water requirements, Middle Egypt.

Plating dates and irrigation regimes play an important role on yield and quality of sugar beet. Taha *et al.* (1985) and Badawi (1985) found that sowing sugar beet early (10 Sep.) gave the largest number of leaves / plant, top yield , root weight, root yield / fed and T.S.S.%. Cucci *et al.* (1989) and Ghandorah (1994) stated that the period from 15 Oct. to 1 Nov. was the optimum data for plating sugar beet . Metwally 1998) found that the early plating date gave the best results of number of leaves / plant, root diameter, root weight at all studied ages. At harvest, significant increase in root yield / fed. T.S.S. %, juice purity and sucrose % was obtained.

Attia and Sultan (1987) found that irrigation every 12 days gave significantly higher root yield. Dimian *et al.* (1987) studied the effect of soil moisture stress (=25, 50 and 75 depletion of available water). They found that seasonal water use by sugar beet varied widely between 45.5 and 62.2 cm under the different treatments . Water consumption increased as soil moisture stress decreased.

Ibrahim *et al.* (1993) reported that water requirements of sugar beet varied between 59.56 and 46.67 cm / season; The values of water consumptive use were 58.06, 55.04 and 49.86 cm. for the 2, 3, 4, weeks irrigation intervals, respecfively. The water use efficiency was 8.66 kg root / m^3 of water consumed.

Rayan *et al.* (1997) showed that irrigation after 25-30% depletion of available soil moisture gave the maximum root yield, sucrose percentuge and root weight. The values of water consumptive use were 2253, 2116 and 2071 m^3 / fed for the treatments of irrigation after 25-30%, 45-50 %and 65-70% depletion of available soil moisture, respectively. Average crop coefficient was 0.72 and maximum water use efficiency was 14.6 kg root / m^3 under the irrigation after 25 - 30 % depletion of available soil moisture.

Material and Methods

Two field experiments were conducted at Sids Agricultural Research Station (Middle Egypt) during the two successive growing seasons 1995 / 96 and 1996/97 to study the effect of planing dates and irrigation treatments on sugar beet (*Beta vulgaris* L.) cv. Ras Poly and its productivity.

A split-plot design with four replications was used, three planting dates *i.e.* 25 Sept. (A_1), 10 Oct. (A_2), 25 Oct. (A_3) were arranged randomly in the main

plots , while four irrigation treatments, *i.e.* irrigation at a depletion of 40 % from available soil moisture (B_1), 60 % (B_2), 80% (B_3) and irrigation in normal production of sugar beet as a control (B_4) in the sub - plots. The sub-plot area was 42 m^2 (8.75 x 4.8 m). It consists of 8 ridges, 8.75 m long and 60 cm width.

The distance between hills was 20 cm. The previous crop was corn (*Zea maiz* L.) in both seasons. Agronomic practices and fertilization applied to the expriment were those recommended in the region.

Results of chemical, soil analysis according to Jackson (1967) and some of soil-water characteristics for the trail sites are sown in Tables 1 and 2, respectively.

Samples of five individual plants were taken randomly from each sub - plot at different periods , *i.e.* 45, 75 and 105 days from sowing to determine root length (cm), root diameter (cm) , fresh root weight (gm), number of leaves / plant and fresh leaves weight / plant (gm). At harvest, number of plants / fed were counted and ten plants from each plot were taken to determine root length (cm) , root diameter (cm), root weight (gm), root yield / fed. (ton / fed.) and top yield (ton / fed).

TABLE 1. Mechanical and chemical soil analysis of the experimental sites in 1995/96 and 1996 / 97 seasons.

Characteristics	1995 / 96	1996 / 97
Mechanical analysis		
Sand %	20.25	16.42
Silt %	34.80	31.38
Clay %	44.95	52.20
Soil texture	Clay	Clay
Chemical analysis		
O.M. %	2.2	2.04
PH	7.7	7.9
E.C. mmhos / cm (1 : 5)	0.55	0.57
Cations and anions meq / L.		
Ca^{++}	2.6	2.8
Mg^{++}	2.2	2.1
Na^{+}	0.70	0.78
K^{+}	0.05	0.04
CO_3^{-}	-	-
HCO_3^{-}	5.0	5.0
Cl^{-}	0.35	0.54
SO_4^{-}	0.22	0.18

TABLE 2. Some soil-water characteristics for the experimental sites at different depth in 1995 / 96 and 1996 / 97 seasons.

Sample depth (cm)	FC %	PWP %	ASM %	D_b (g / cm^3)
	1995 / 96			
0 - 15	42.40	20.00	22.40	1.176
15 - 30	35.90	18.80	17.10	1.244
30 - 45	33.45	15.00	18.45	1.251
45 - 60	31.71	14.50	17.21	1.431
	1996 / 97			
0 - 15	42.40	20.93	21.47	1.186
15 - 30	36.99	18.02	18.97	1.261
30 - 45	33.41	15.61	17.80	1.264
45 - 60	32.61	15.58	17.03	1.336

FC = Field capacity

ASM = Available soil moisture

PWP = Permanent wilting point

D_b = Soil bulk density

Quality characters, *i.e.* total soluble solids of root (TSS) was measured by hand refractometer at 60, 90, 120 days and at harvesting. Sucrose percentage was estimated polarimetrically as mentioned by Le-Docte(1927).

Apparent purity percentage was calculated according to the following equation $\text{Purity \%} = \frac{\text{Sucrose \%}}{\text{TSS \%}} \times 100$

All data were subjected to statistical analysis according to procedures out lined by Snedecor and Cochran (1967).

Results and Discussion

Growth characters

The effects of planting dates on root length, root diameter and root fresh weight were significant at all ages in the two seasons (Table 3, 4 and 5). The mid sowing date (10^{th} of Oct.) gave. the greatest root length, while early planting date (25 Sep.) produced the thicknest and heaviest root at all ages in both seasons.

TABLE 3. Effects of planting dates, irrigation treatments and their interaction on root length (cm) at different ages in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	45 days				75 days				105 days			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	21.00	23.63	19.75	21.46	29.75	28.75	27.38	28.63	33.63	37.25	34.13	35.00
B_2	23.25	24.88	21.75	23.29	30.50	33.88	27.63	30.67	38.13	37.75	35.38	37.08
B_3	23.75	26.55	22.00	24.00	31.75	36.50	29.13	32.46	39.50	38.75	37.13	38.46
B_4	21.00	24.50	20.63	22.04	30.00	32.75	27.88	30.21	37.38	37.00	34.50	36.29
Mean	22.25	24.81	21.03	22.69	30.50	32.97	28.00	30.49	37.16	37.69	35.28	36.72
A	2.50				2.58				1.43			
LSD 5% B	2.15				1.58				2.04			
AB	3.72				2.91				2.53			
	1996 / 97											
B_1	18.15	18.28	13.45	16.63	27.00	26.58	21.28	24.95	28.83	29.35	29.43	29.20
B_2	20.65	18.90	14.80	18.13	27.93	28.78	23.93	26.88	29.58	30.45	30.03	29.99
B_3	20.85	21.78	15.80	19.21	28.85	30.28	28.50	29.21	30.75	33.03	38.40	31.73
B_4	19.73	18.48	14.73	17.64	27.53	26.90	23.63	26.03	29.33	29.75	29.98	29.68
Mean	19.84	19.36	14.50	17.90	27.83	28.13	24.34	26.76	29.60	30.64	30.21	30.15
A	1.22				1.27				1.30			
LSD 5% B	0.75				1.31				1.51			
AB	1.31				2.27				2.63			

TABLE 4. Effects of planting dates, irrigation treatments and their interaction on root diameter (cm) at different ages in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	45 days				75 days				105 days			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	2.90	2.68	1.48	2.35	5.90	6.35	5.60	5.95	8.88	8.00	6.65	7.84
B_2	2.68	2.18	1.30	2.05	5.95	5.88	5.35	5.72	8.53	7.68	6.45	7.55
B_3	2.13	1.95	1.00	1.69	5.55	4.68	5.15	5.13	8.20	6.98	5.88	7.02
B_4	2.43	2.15	1.13	1.90	5.85	5.68	5.35	5.63	8.40	7.30	6.35	7.35
Mean	2.53	2.24	1.23	1.99	5.81	5.64	5.36	5.68	8.50	7.49	6.33	7.44
A	0.26				0.54				0.48			
LSD 5% B	0.22				0.38				0.31			
AB	0.38				0.65				0.56			
	1996 / 97											
B_1	3.03	2.75	1.48	2.42	6.53	5.63	6.15	6.10	8.76	7.90	6.63	7.76
B_2	3.63	2.35	1.30	2.09	6.00	5.40	5.35	5.58	8.75	7.63	6.45	7.61
B_3	2.20	2.05	1.00	1.75	4.63	4.98	5.08	4.87	8.38	7.08	5.95	7.11
B_4	2.38	2.15	1.10	1.88	5.78	5.38	5.20	5.45	8.50	7.23	6.38	7.37
Mean	2.56	2.33	1.22	2.03	5.73	5.34	5.43	5.50	8.59	7.44	6.35	7.46
A	0.15				0.21				0.53			
LSD 5% B	0.20				0.42				0.42			
AB	0.34				0.73				0.73			

The increase in weight and diameter of the root in early planting date could be due to its longer vegetative growth period under such environmental conditions which seems to be more suitable for sugar beet growth. Such effect of root weight can be attributed to increasing of root diameter and roots are the tallest at the mid sowing date (10^{th} of Oct.). Similar results were obtained by Taha (1985) and Badawi (1985).

TABLE 5 . Effects planting dates, irrigation treatments and their interaction on fresh root weigth (g/plant) at different ages in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	45 days				75 days				105 days			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	93.13	47.65	25.44	55.41	417.75	237.75	121.50	257.33	775.50	625.25	329.25	597.67
B_2	91.08	43.29	20.69	51.68	383.00	235.75	119.50	246.08	690.75	597.75	355.00	547.83
B_3	67.52	33.72	18.30	39.85	324.25	165.50	107.00	198.92	564.25	543.75	340.75	482.92
B_4	69.12	63.80	18.64	41.52	333.25	200.00	115.25	216.17	639.50	568.75	370.50	526.25
Mean	80.21	40.36	20.77	47.11	364.56	210.00	115.81	230.12	667.50	283.88	364.63	538.67
A	13.59				58.90				31.13			
LSD 5% B	10.94				31.76				97.34			
AB	18.94				54.86				168.49			
	1996 / 97											
B_1	35.45	30.65	9.93	25.34	298.90	240.90	85.80	208.53	482.50	378.90	342.00	401.00
B_2	27.65	21.85	8.30	19.27	246.50	183.90	70.93	167.11	101.50	356.50	327.75	361.92
B_3	18.78	20.83	5.85	15.15	144.95	173.83	58.75	125.84	325.50	331.00	298.25	318.25
B_4	24.95	22.15	6.28	17.79	226.43	178.10	65.25	156.58	356.75	334.25	320.50	337.17
Mean	26.71	23.87	7.59	19.39	229.19	194.18	70.18	164.51	391.56	350.06	322.23	354.58
A	3.09				23.52				49.50			
LSD 5% B	3.47				27.95				45.99			
AB	6.01				48.47				76.97			

Regarding to effect of irrigation treatments on root length., root diameter and root weight (Tables, 3, 4 and 5), it was significant at all ages in both seasons. The tallest root resulted with the treatment of irrigation at a depletion of 80 % from available soil moisture B_3 in both seasons. The results show that roots grow deeper under water stress than under excessive water status. On the other hand, root diameter and root weight increased where B_1, irrigation at depletion of 40% from available soil water. Emara (1996) and Abd EL-Wahab *et al.* (1996) obtained similar results.

The interaction between A_1 and irrigation treatment B_1 gave the greatest values of root diameter and root weight, while with B_3 for root length only.

The influence of planting dates on number of leaves per plant and fresh leaves weight / plant was significant at all ages in both seasons (Tables 6 and 7).

Results showed that 25 Sept. as a planting date produced the greatest number of leaves / plant and heaviest fresh leaves weight / plant. This increase may be a reflection of accelerated crop phonology brought about the comparatively warmer temperature that prevail during their vegetative growth. Similar results were obtained by Badawi (1985).

Data presented in Tables 6 and 7 indicate that delaying the irrrigation time from 40 to 80 % depletion caused a remarkable decrease in leaves number and leaves weight / plant at all ages in both seasons. The greatest value was obtained

TABLE 6 . Effects of planting dates, irrigation treatments and their interaction on number of leaves / plant at different ages in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	45 days				75 days				105 days			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	14.25	12.00	10.25	12.17	19.50	16.50	13.00	16.33	24.25	22.25	20.00	22.17
B_2	12.75	11.25	9.50	11.17	19.25	16.00	13.00	16.08	23.00	21.25	19.75	21.33
B_3	12.25	10.75	8.50	10.50	18.75	13.75	12.00	14.83	21.00	20.25	18.00	19.75
B_4	12.75	11.25	9.25	11.08	18.25	14.25	12.75	15.08	22.00	21.00	18.50	20.50
Mean	13.00	11.31	9.38	11.23	18.94	15.13	12.69	15.58	22.56	21.18	19.06	20.93
A	0.73				1.62				2.27			
LSD 5% B	0.82				1.02				1.69			
AB	0.42				1.77				2.92			
	1996 / 97											
B_1	9.75	10.00	8.75	9.50	19.25	16.50	12.50	16.08	21.50	20.25	19.00	20.25
B_2	9.50	9.00	8.25	8.92	19.25	15.50	12.00	15.58	20.75	19.75	18.50	19.67
B_3	9.06	8.25	7.25	8.17	16.25	14.50	11.00	13.92	20.25	19.00	16.50	18.58
B_4	9.26	9.25	8.00	8.83	18.50	15.25	11.50	15.08	20.75	19.25	18.25	19.12
Mean	9.38	9.13	8.06	8.86	18.31	15.44	11.75	15.17	20.81	19.56	18.06	19.48
A	0.69				1.42				1.74			
LSD 5% B	0.59				0.91				1.44			
AB	1.03				1.57				2.50			

TABLE 7 . Effects of planting dates, irrigation treatments and their interaction on fresh leaves weight / plant (g) at different ages in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	45 days				75 days				105 days			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	242.42	210.84	92.32	181.86	946.50	614.00	338.25	632.92	1202.3	1077.0	617.50	965.60
B_2	225.79	189.17	91.21	168.72	723.75	557.50	337.00	539.42	1159.8	1060.0	612.25	944.02
B_3	211.57	170.98	84.01	155.52	645.50	535.25	316.75	499.17	833.50	847.75	603.00	761.42
B_4	224.20	170.39	88.16	160.92	714.00	555.25	630.75	533.33	950.75	916.00	613.25	826.67
Mean	225.99	185.34	88.93	166.75	757.44	565.50	330.69	551.21	1036.6	975.19	611.50	874.43
A	39.24				148.66				178.97			
LSD 5% B	38.13				74.81				175.23			
AB	66.03				129.57				303.93			
	1996 / 97											
B_1	193.22	181.08	73.45	149.25	1144.5	860.75	312.25	772.50	1021.3	1063.8	896.00	993.67
B_2	159.23	155.78	72.20	129.07	930.25	662.75	259.95	617.58	949.75	925.75	812.75	869.08
B_3	117.43	134.13	46.28	99.28	517.25	548.00	154.75	406.67	882.50	837.50	618.75	779.58
B_4	148.38	143.00	55.08	115.48	759.25	570.00	196.00	208.42	938.25	898.75	802.25	879.75
Mean	154.56	153.49	61.75	123.27	837.81	660.38	230.69	576.29	947.94	931.44	782.44	887.27
A	10.59				73.67				137.43			
LSD 5% B	12.59				81.70				128.87			
AB	21.80				150.77				223.21			

by irrigation at a depletion of 40 % followed by 60 % then normal irrigation as recommended B_4 . Similar trend was obtained by Emara (1996). Over the two seasons, the highest number and fresh weight of leaves / plant were obtained from early planting date with treatment B_1.

Yield and yield components

Results shown in Table 8 clarify that there was a significant increase in number of plant / fed at harvest in favour of late planting date over the early ones in both seasons. Such increase could be due to that the weather conditions associated with seed germination and early seedling growth in case of early planting appears to be comparatively proper for giving a good stand.

TABLE 8. Effect of planting dates, irrigation treatments and their interaction on number of plants / fed at harvest in 1995 / 96 and 1996 / 97 seasons.

Planting dates A	1995 / 96				1996 / 97			
Irrig. Treat. B	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	22065	20970	23992	22342	24330	23055	26000	24462
B_2	22747	21435	22612	22264	24172	22642	26077	24297
B_3	22650	19840	22575	21688	24412	23175	25597	24395
B_4	23370	20070	23062	22167	26242	22852	26002	25032
Mean	22708	20578	23060	22115	24789	22931	25919	24546
A	16.39				16.41			
LSD 5% B	10.94				10.62			
AB	NS				NS			

Concerning irrigation treatment effect, it is clear from Table 8 that number of plants / fed at harvest with significantly decreased increasing the depletion of available soil water.

Regarding to the effect of sowing dates on root length, root diameter, root weight, top yield and root yield / fed at harvest, it was significant in both seasons. Data presented in Tables 9 and 10 showed that early planting date 25Sept.) was associated with the greatest values of the yield and yield components in both seasons. This results due to more favourable environmental conditions such as temperature, light intensity and photo period which was reflected on root length, root diameter, root weight and top yield and subsequantly root yield / fed. Similar results were obtained by Taha *et al.* (1985) and Metwally (1998).

Irrigation treatments had significant effect on yield and its components in both seasons) (Tables 9 and 10). The highest values for root length , root diameter, root weight and top yield / fed were obtained from the irrigation when 40 % of available soil water was depletion B_1, the mentioned traits decreased gradually and consistently as depletion level increased up to 80 %.

TABLE 9 . Effects of planting dates, irrigation treatments and their interaction on root length , root diameter and root weight at harvest in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	Root length (cm)				Root diameter (cm)				Root weight (g 0			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	41.40	40.35	38.90	40.21	16.00	15.38	13.95	15.11	1387	1353	1142	1294
B_2	43.55	43.15	39.50	42.07	15.05	15.08	13.40	14.53	1313	1308	1176	1266
B_3	45.50	44.10	41.05	43.55	14.55	14.57	12.70	13.94	1187	1187	989	1121
B_4	42.30	40.60	39.03	40.64	14.75	14.83	12.90	14.16	1178	1283	1076	1179
Mean	43.19	42.05	39.62	41.62	15.09	14.96	13.24	14.44	1266	1283	1096	1215
A	2.25				0.36				97			
LSD 5% B	1.34				6.53				100			
AB	NS				NS				NS			
	1996 / 97											
B_1	37.73	32.98	29.78	33.49	11.70	9.13	8.78	9.87	1317	1333	1063	1238
B_2	38.58	34.55	31.78	34.97	10.20	8.88	8.55	9.21	1285	1270	1039	1198
B_3	40.03	34.60	34.35	36.33	9.70	8.43	8.18	8.75	1183	1175	914	1091
B_4	37.93	33.88	31.43	34.41	10.40	8.75	8.35	9.17	1161	1243	968	1124
Mean	38.57	34.00	31.84	34.80	10.50	8.79	8.45	9.25	1237	1255	996	1162
A	1.59				0.67				37			
LSD 5% B	1.23				0.55				93			
AB	NS				NS				NS			

TABLE 10. Effects of planting dates, irrigation treatments and their interaction on root yield, top yield and sugar yield in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season											
	Root yield (ton / fed.)				Top yield (ton / fed.)				Sugar yield (ton / fed.)			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	30.41	28.34	27.06	28.61	14.64	13.80	12.72	13.72	4.60	4.28	4.19	4.36
B_2	29.72	28.09	26.51	28.11	14.60	10.69	11.73	12.34	4.78	4.35	4.47	4.53
B_3	26.91	23.50	22.36	24.26	12.38	9.73	9.17	10.43	4.06	3.80	3.91	3.95
B_4	27.51	25.70	24.83	26.01	12.91	10.97	11.33	11.73	4.64	3.84	3.95	4.14
Mean	28.64	26.41	25.19	26.75	13.63	11.30	11.24	12.05	4.52	4.07	4.13	4.22
A	0.99				1.85				0.22			
LSD 5% B	2.18				1.48				0.36			
AB	2.51				NS				0.95			
	1996 / 97											
B_1	31.83	30.78	27.60	30.07	20.95	21.10	18.58	20.21	4.83	4.80	4.48	4.70
B_2	30.93	28.78	27.03	28.91	20.25	16.75	18.33	18.44	4.83	4.55	4.45	4.61
B_3	28.78	27.20	23.95	26.64	17.00	14.38	14.50	15.29	4.68	3.95	4.10	4.24
B_4	30.40	28.35	24.83	27.86	18.10	15.35	16.70	16.71	4.58	4.60	4.95	4.71
Mean	30.48	28.78	25.85	28.37	19.08	16.94	16.98	17.66	4.73	4.48	4.50	4.58
A	0.69				N.S				0.19			
LSD 5% B	1.91				3.50				0.34			
AB	2.64				N.S				0.85			

Results of yield components may be attributed to healthly plants, tallest , thickness and heaviest roots which contributed to high root yield / fed. whereas treatment B_3 had the lowest values of the mentioned characters. Attia and Sultan (1987) Emara (1996) came to the same findings .

The highest values of studied characters of yield and yield components were obtained from plants planted in 25 Sept. A_1 and depletion of 40 % from available soil water B_1.

Quality characters

Data in Tables 10 and 11 show that the influence of planting date on quality characters of sugar beet was significant on total soluble solids (TSS) sucrose percentage, purity and sugar yield / fed in both seasons . Early planting date (25 Sept.) was associated with the highest values. The increase in this treats in early sowing date could be due to the minimum accumulated night temperature in the period during production of T.S.S. and sucrose and to a longer growing season between planting date and harvest comparing with other planting dates. Similar results had been observed by Metwally (1998).

TABLE 11. Effects of planting dates, irrigation treatments and their interaction on sucrose % and purity % at harvest in 1995 / 96 and 1996 / 97 seasons.

Pl. dates A / Ir. Treat B	1995 / 96 season							
	Sucrose %				Purity %			
	A_1	A_2	A_3	Mean	A_1	A_2	A_3	Mean
B_1	17.38	16.58	16.18	16.71	79.54	78.50	77.60	78.54
B_2	16.87	15.53	16.10	16.15	77.47	73.44	75.38	75.43
B_3	15.60	15.08	14.70	15.12	73.39	75.35	70.00	72.91
B_4	15.97	14.95	15.15	15.34	78.12	71.30	74.70	74.71
Mean	16.46	15.54	15.53	15.83	77.13	74.65	74.42	75.39
A	0.59				4.68			
LSD 5% B	0.63				3.42			
AB	1.09				5.92			
	1996 / 97							
B_1	17.15	15.50	16.25	16.30	82.05	75.23	77.28	78.18
B_2	16.50	16.85	15.50	16.28	76.36	80.31	76.40	77.69
B_3	15.20	15.15	15.10	15.15	76.57	74.36	77.42	76.11
B_4	16.95	14.75	15.15	15.61	80.91	76.70	75.01	77.54
Mean	16.45	15.56	15.50	15.83	78.97	76.65	76.52	77.38
A	0.74				1.73			
LSD 5% B	0.78				4.45			
AB	1.34				8.01			

Concerning the effect of irrigation treatments on quality characters of sugar beet, (Tables 10 and 11), it was significant in both seasons. All characters in B_1 treatment was significantly higher than other treatments. In general early planting date with irrigation at 40 % depletion B_1 gave the highest values.

On conclusion, early planting is better. A certain delay of irrigation (B_1-40% depletion) may lead to higher beat and sugar yields. This means, irrigation water can be saved and the yield will increase.

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استجابة بنجر السكر لمواعيد الزراعة والاحتياجات المائية فى مصر الوسطى. ٢- المحصول ومكوناته

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أقيمت تجربتان حقليتان بمزرعة محطة البحوث الزراعية بسدس - محافظة بنى سويف خلال موسمى ١٩٩٥ / ١٩٩٦، ١٩٩٦ / ١٩٩٧ وذلك لدراسة العلاقة بين مواعيد الزراعة (٢٥ سبتمبر، ١٠ أكتوبر، ٢٥ أكتوبر) ومعاملات الرى (الرى عند استنفاذ ٤٠ ، ٦٠ ، ٨٠ ٪ من رطوبة التربة بالإضافة لمعاملة الرى العادى كمعاملة الكنترول) وتأثير ذلك على انتاجية بنجر السكر صنف راس بولى Ras Poly وكانت أهم النتائج :

١- كانت هناك زيادة معنوية فى صفات النمو : طول الجذر ، سمك الجذر ، الوزن الطازج للجذر والأوراق وعدد الأوراق للنبات عند الزراعة المبكرة (٢٥ سبتمبر) فى جميع الأعمار المدروسة لموسمي التجربة

٢- عند الحصاد أعطى ميعاد الزراعة المبكر أفضل النتائج لصفات سمك الجذر وقطر الجذر ومحصول الجذور والأوراق والسكر بينما أعطى ميعاد الزراعة الأوسط (١٠ أكتوبر) اكبر قيمة لوزن الجذر . كما أعطت الزراعة المتأخرة اكبر عدد من النباتات للفدان في موسمى التجربة .

٣- المواد الصلبة الكلية ، النسبة المئوية للسكروز ، النقاوة زادت معنويا عند الزراعة المبكرة (٢٥ سبتمبر) فى موسمي التجربة .

٤- أعطت معاملة الري عند استنفاذ ٤٠ ٪ من الرطوبة الأرضية أعلى القيم لجميع الصفات المدروسة (صفات النمو - المحصول ومكوناته - صفات الجودة) وذلك فى موسمى التجربة.

٥- أعطى تفاعل معاملة الزراعة المبكرة (٢٥سبتمبر) مع معاملة الرى عند استنفاد ٤٠ ٪ من الرطوبة الأرضية أعلى القيم لجميع الصفات تحت الدراسة فى موسمي التجربة.