EFFECT OF SOWING DATE, IRRIGATION INTERVAL AND NITROGEN FERTILIZATION ON YEILD AND QUALITY OF SUGAR BEET UNDER UPPER EGYPT CONDITIONS

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Abstract

Two field trials were carried out at Shandaweel Research Station (Sohag Governorate) in two successive growing seasons 1995/1996 and 1996/1997 to study the effect of twelve treatments which represent the combination between two sowing dates (November 1st and November, 15th), two irrigation intervals (7 and 14 days) and three nitrogen levels (40, 60 and 80 Kg N/feddan) on yield and quality of sugar beet. A split-split plot design in four replications was used. The obtained results showed that non of the studied characters was significantly affected by the two sowing dates except top yield. Scheduling irrigation at 7-day intervals produced significantly higher root yield compared with that of 14-day intervals in the second season.Increasing nitrogen level increased root diameter and root yield significantly, but decrease sucrose percentage significantly in the second season, thus sugar yield was not significantly increased in both seasons.

INTRODUCTION

Egypt suffers from a gap between the consumed and produced sugar which reaches nearly 650000 tons. As an attempt to narrow the gap of that strategic commodity i.e., sugar, expanding the area under sugar beet becomes a possible means of increasing the raw materials used sugar extraction. Nowadays, there is a tendency to introduce sugar beet crop in Middle and Upper Egypt to fulfill the manufacturing capacity of sugar factories (extracting sugar from sugar cane) after adding the clicing and diffusion system to there front. However, introducing sugar beet crop to Middle and Upper Egypt conditions which are characterized with high temperature and solar radiation make it necessary to invetigate the nutritional and water needs as well as the appropriate sowing date to obtain high

yield and quality. D'amato *et al.* (1983) showed that the highest sucrose % was obtained with a seasonal irrigation amantities of either 3000 m3/ha (at mean intervals of 11-12 days) or 5000 m3/ha (mean intervals of 7-8 days). Cucci and Caro (1986) revealed that irrigation increased root yield by 81% and sucrose yield by 39% while it had no significant effect on juice purity. They added that the most effective seasonal irrigation volumes were 3000 to 5500 m3/ha. Emara (1990) showed that all yield components were significantly affected by irrigation when sugar beet was irrigated at 28 day instead of 14 day intervals. He added that irrigation every 28 days caused a significant reduction in root diameter. Ibrahim *et al.* (1993) revealed that 2-3 weeks irrigation intervals gave root yield of 20.573 tons/feddan compared with 18.527 tons/feddan obtained with 4-week intervals. Ramadan (1986) found that the root size in respect of root lengh and diameter were improved by increasing nitrogen level. Mahmoued, *et al.* (1990) obtained the highest top and root yield from the highest nitrogen level ranging from 40 to 80 kg/fed. He added that sugar yield increased as nitrogen application rate increased from 40 to 60 kg/fed then a reduction in sugar yield at 80 Kg N/fed was recorded. El-Shafei (1991) found that application of nitrogen frtilizer at rates (45,60 and 75 kg N/feddan gave a gradual and significant increase in top fresh weight, root length and root diameter. He added that increasing nitrogen from 60 to 75 kg/feddan had insgnificant effect on total soluble solids, sucrose and purity percentage. He reported that adding 75 kg N/feddan gave the highest root and sugar yields. Regarding the effect of sowing date, Khafaga *et al.*(1971) in Egypt revealed that sucrose and purity percentage decreased with delay in sowing of sugar beet. Fayed *et al.* (1981) in Egypt reported that top yield was higher with the earlier sowing. Eraky *et al.* (1983) in Egypt indicated that early sowing date in October had always the highest root yield of sugar beet. Besheet (1986) in Egypt found that the delay in sowing till Novmber 2nd was associated with an increase in top yield/Feddan, thereafter more delaying markedly decreased it. He added that earlier sowing date at October gave the best results with root diameter and length but had no significant effect on juice purity percentage. Erjala (1991) in Finland, found that sugar beet yields were increased by 14% with early sowing time compeard with the normal time of sowing. Malec (1992) in Poland, demonstrated that early sowing of sugar beet led to higher crop yield but inferior quality and lower sugar content. Ghandorah and Refay (1994) in Saudi Arabia, observed, that top yield, total soluble solids, reducing sugars showed diferences between sowing dates of sugar beet crop.

MATERIALS AND METHODS

Two field trials were carried out at Shandaweel Research Station (Sohag Governorate) in the two successive growing seasons 1995/1996 and 1996/1997 to study the effect of sowing date, irrigation interval and nitrogen fertilization on yield and quality of sugar beet. Each field trial included twelve treatments representing the combination between two sowing dates (November 1st and November 15 th), two irrigation intervals (7 and 14 days as indicated in Table 1) and three nitrogen levels (40, 60 and 80 kg N/feddan). Treatments were arraged in split-split plot design in four replications where sowing dates were allocated in the main plots while irrigation intervals were distributed in sub-plots and nitrogen levels were arranged in sub-sub plots. Sup-plot ariea was 42 m^2 (12 ridges 7 m long and 50 cm. apart) specing between hills were 20cm. Physical and chemical properties of the upper 20 cm of the experimental soil (50.1% clay, 28.5% silt, 21.4% sand and 28.9 ppm available N, 18.0 ppm P and 554 ppm K). Soil moisture percentage of the experimental site was 33% at the field capacity. Nitrogen fertilizer was applied as Urea (46% N) in two equal doses, the first dose was added after thinning (45 days after sowing) and the second one was applied on month after the first. Moreover 30kg p2o5 (in the form of supurphosphate 15% p_2o_5) and 48 kg k_2o (in the form of potassium sulphate 48% k_2o) per feddan were added before sowing. The previous crop was sorghum in both seasons. A commercial sugar beet variety Kawemira poly germ was used in both seasons. Dry methods used in both growing seasons. Irrigation was conducted through a water meter of 0.1 cubic meter accuracy used to be tightly hooked where the wide inlet towards the main permanent canal and the outlet towards the lateral temporary field canal of the irrigated plots.

Table 1. Water applied (m^3) for sugar beet sown at two sowing dates and irrigated at two irrigation intervals during the growing seasons 1995/1996 and 1996/1997.

Season		1995/1996		1996/1997	
Sowing date	Irrig. Interval	No. of irrig.	Water (m3)	No. of irrig.	Water (m3)
November 1st	7 days	23	2712	23	2859
	14 days	14	2275	14	2475
November 15 th	7 days	23	2686	23	2735
	14 days	14	2100	14	2358

data recorded :

1- Root length (cm).

2- Root diameter (cm).

3- Total soluble solids % (TSS%) was determined using Hand "referractometer."

4- Sucrose % (dtermined as described by Le Docte 1927).

5- Purity % was calculated according to the following equation.

Purity % = Sucrose % x 100 / TSS %.

At harvest, 8 ridges from each plot were collected and weighted to determine the following characters:

6- Top yield (tons/feddan).

7- Root yield (tons/feddan).

8- Sugar yield (tons/feddan) was calculated according to the following equation:

Sugar yield = Root yield x Sucrose % x Purity %

Statistical analysis :

The collected data were subjected to proper statistical analysis of split plot design according to Snedecor and Cochran (1981). Treatments means were copared by using LSD as given by waler and duncan (1969) at 5% level of probability.

RESULTS AND DISCUSSION

Top yield:

Data shown in Table 2 showed that top yield responded significantly to the tested sowing dates i.e., first of November and November 15th in the first and seconed seasons. The presented data showed that sowing sugar beet in mid Novermber was favourable enough to produce higher top yields being 20.09 and 30.55% compared with that sown early on November 1st in the first and second season, respectively .

The results obtained revealed that there was no clear cut trend due to varying irrigation frequency regarding top yield where the 14-day intervals produced significantly higher top yield than the 7-day ones in the first season. However, a reverce effect was observed in the second season.

Top yield was insignificantly affected by the applied nitrogen levels in both seasons. Meanwhile, a gradual slight increase in top yield was recorded as the nitrogen level was raised to 80 and 60 Kg/ N/fed in the first and second season, respec-

Table 2. Effect of sowing dates, irrigation intervals and nitrogen fertilization level on top and root yield at harvest in (1995/ 1996 and 1996/1997) season.

Sowing dates	Irrigation Intervals	ToP yield(ton/feddan)								Root yield (ton/feddan)							
		1995/1996			Average	1996/1997			Average	1995/1996			Average	1996/1997			Average
		Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)			
		40	60	80		40	60	80		40	60	80		40	60	80	
1st of November	7 days	7.75	6.93	8.92	7.87	6.51	8.27	10.46	8.41	17.70	19.95	21.15	19.60	22.80	23.50	26.60	24.30
	14 days	8.85	10.06	10.07	9.66	8.69	8.72	7.03	8.14	20.55	19.05	19.20	19.60	21.10	23.45	25.40	23.31
Average		8.30	8.50	9.49	8.76	7.60	8.49	8.75	8.28	19.12	19.50	20.17	19.60	21.95	23.47	26.00	23.80
15th of November	7 days	10.11	9.57	10.31	9.99	11.57	11.39	11.92	11.63	19.80	18.50	20.00	19.43	19.35	22.25	23.00	21.53
	14 days	9.95	12.87	10.35	11.05	10.36	11.43	8.20	9.99	16.20	18.15	19.20	17.85	19.25	21.65	21.75	20.88
Average		10.03	11.22	10.33	10.52	10.96	11.41	10.06	10.81	18.00	18.32	19.60	18.64	19.30	21.95	22.37	21.20
Interaction of IxN	7 days	8.93	8.26	9.61	8.93	9.04	9.83	11.19	10.02	18.75	19.22	20.57	19.51	21.07	22.87	24.80	22.91
	14 days	9.40	11.46	10.21	10.36	9.52	10.07	7.62	9.07	18.37	18.60	19.20	18.72	20.17	22.55	23.57	22.10
Total averge of N		9.16	9.86	9.91	9.64	9.28	9.95	9.40	9.54	18.56	18.91	19.89	19.12	20.62	22.71	24.18	22.50

L.S.D at 5% level for:				
Sowing dates (S)	0.71	0.53	NS	NS
Irrigation intervals (I)	0.42	NS	NS	0.42
Nitrogen fertilizer (N)	NS	NS	1.22	0.81
S xI	NS	NS	NS	NS
S xN	NS	NS	NS	1.12
I x N	NS	3.19	NS	NS
Sx I x N	NS	NS	2.45	NS

tively. These result are in line with those found by Mahmouced *et al.* (1990-b) The enhancing influence of nitrogen on top yield could be due to its distinct role as an essential constructive element of protein and chlorophyll which in turn was reflected on an increase in leaf area and weight of sugar beet plants.

Irrespective the significant response of top yield to the combination of irrigation x nitrogen, all the studied combinations had no significant influence on this character.

Root Yield :

The results presented in Table 2 cleared that sowing sugar beet either on November, 1st or late on November 15th had no significant effect on root yield in both of seasons. However, it could be noticed that sugar beet sown earlier on November, 1st produced slightly and insignificanly higher root yield compared with that sown on November 15th in both seasons. These results are in agreement with those reported by Malec, (1992) and Eraky *et al.* (1983).

Scheduling irrigation at 7 and/or 14-day intervals resulted in a significant effect on root yield in the second season. However, the differences between root yields produced under the given irrigation intervals failed to reach the level of significance in the first season. Meanwhile, it could be observed that applying irrigation water at intervals of 7 days generally attained higher root yield compared with 14-day ones being 4.22 and 3.69% in the first and second season, respectively. This result coincides with that found by Ibrahim *et al.* (1993).

Data demonstated in Table 2 showed that root yield was gradually and significantly increased as the applied dose of nitrogen level was increased up to 80 Kg N/fed in both seasons. Also, It was noticed that appling the highest nitrogen level (80 Kg N/fed) increased root yield by 7.11 and 17.27% over the lowest nitogen level (40 Kg N/fed) in the first and second season, respectively. These results are in accordance with those found by Mahmoed *et al.* (1990-b) and El-Shafei (1991). The effective impact of nitrogen on root yield could be attributed to its distinct role as an essential constituent of protein, amide, amino acid, co-enzymes and chlorophyll as well as its effect on the assimilatory system (sugar beet leaves) and in turn plant capacity of photosynthesis and dry matter accumulation. The role of nitrogen in increasing root yield may be partially due to increasing water content of beet roots.

Except for the interaction of sowing date x irrigation intervals x nitrogen lev-

el (in the first season) and sowing date x nitrogen level (in the second season), the interactions between the levels of the studied factors had no sinificant effect on root yield. The highest root yield was produced from sugar beet sown on the first of November, irrigated at 7-day intervals and fertilized with 80 Kg N/fed in both seasons.

Sucrose percentage :

The results in Table 3 demonstrated that sucrose percentage was insignificantly responded to the tested sowing dated i.e. Nov. 1st or 15th. Similarly, irrigation intervals had no significant effect on sucrose percentage.

The presented data indicated that sucrose percentage was gradually and significantly decreased as the applied doses of nitrogen fertilizer increased from 40 to 80 Kg/fed in the second season. However, there were no statistical differences in sucrose percentage due to the used nitrogen levels in the first season. A reduction in sucrose percentage amounted to 5.7% was recorded by applying highest nitrogen level (80 Kg/fed) as compared with the lowest (40 Kg/fed) in the first season coressponding to 8.66% in the second one. The negative effect of nitrogen on sucrose percentage may be due to its dillution effect in increasing. The present result is in general agreement with that shown by El-Shafei (1991). No significant influences of the interaction between the studied factors were observed concerning this character in both seasons.

Sugar yield:

The results illustrated in Table 3 showed that the obtained sugar yield was not significantly affected by the two sowing dates (1st or 15th of November) in the two growing seasons. However, it could be noticed that beets sown on November 1st produced slightly higher sugar yields amounted to 124 and 691 Kg/fed compared with those sown on November 15th in the first and second season, respectively. These results are in accoadance with found py Erjalal (1991).

The collected data cleared that prolonging irrigation to 14 days or decreasintg it to 7 days did not affect sugar yield in both seasons. This result may be attributed to the great water holding capacity of the soil of the experimental site in Shandaweel.

The obtained results showed that sugar yield was insignificanly influenced by

Table 3. Effect of sowing dates, irrigation intervals and nitrogen fertilization level on sugar yield and sucrose percentage of sugar beet at harvest in (1995/1996 and 1996/1997) season.

Sowing dates	Irrigation Intervals	sugar yield (ton/feddan)								Sucrose %							
		1995/1996			Average	1996/1997			Average	1995/1996			Average	1996/1997			Average
		Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)			
		40	60	80		40	60	80		40	60	80		40	60	80	
1st of November	7 days	1.785	2.305	2.240	2.110	2.640	2.530	2.915	2.695	12.50	13.95	13.00	13.15	15.04	14.25	14.22	14.50
	14 days	2.440	2.030	1.835	2.102	2.530	2.695	2.553	2.587	13.40	13.10	12.20	12.90	14.47	13.88	12.85	13.73
Average		2.211	2.167	2.037	2.106	2.585	2.613	2.725	2.641	12.95	13.52	12.60	13.02	14.75	14.06	13.53	14.11
15 th of November	7 days	2.410	1.925	1.955	2.097	1.855	2.130	1.905	1.973	13.75	13.25	12.15	13.05	13.22	13.24	12.12	12.86
	14 days	1.660	1.955	1.985	1.867	1.865	1.960	1.955	1.927	13.40	14.00	12.65	13.35	13.17	12.37	11.85	12.46
Average		2.035	1.940	1.970	1.982	1.875	2.045	1.930	1.950	13.57	13.62	12.40	13.20	13.19	12.80	11.98	12.66
Interaction of IxN	7 days	2.097	2.115	2.098	2.103	2.262	2.330	2.410	2.334	13.12	13.60	12.57	13.10	14.13	13.74	13.17	13.68
	14 days	2.050	1.993	1.910	1.984	2.197	2.328	2.245	2.257	13.40	13.55	12.42	13.12	13.82	13.12	12.35	13.09
Total averge of N		2.074	2.054	2.004	2.044	2.230	2.329	2.328	2.295	13.26	13.57	12.50	13.01	13.97	13.43	12.76	13.39

L.S.D at 5% level for:				
Sowing dates (S)	NS	NS	NS	NS
Irrigation intervals (I)	NS	NS	NS	NS
Nitrogen fertilizer (N)	NS	NS	NS	0.70
S xI	NS	NS	NS	NS
S xN	NS	NS	NS	NS
I x N	NS	NS	NS	NS
SxIxN	NS	NS	NS	NS

increasing the applied dose of nitrogen from 40 to 80 Kg N/fed in both growing seasons. This result may be due to that the benifical effect of nitrogen in incresing root yield (Table 2) was mostly corresponded to a reduction in sucrose percentage as nitrogen level was raised up to 80 Kg/fed (Table 3) which ultimately contributed in the production of nearely equal amounts of sugar.

There were no significant effects of the interaction between the levels of the studied factors on sugar yield except that of sowing date x irrigation interval x nitogen fertilizer in the first season. The highest sugar yiels (2.44 and 2.66 tons/fed) were recorded when sugar beet was sown on November 1st, fertilized with 40 Kg N/fed (in both seasons) and irrigated at 14-day intervals in the first season and 7-day intervals in the second one, respectively.

Total soluble solids percentage :

The data presented in Table 4 showed that total soluble solids percentage was not significantly affected by the two sowing dates in the first and second seasons. This results is in line with that reported by Ghandorah and refay (1994).

The obtained results also cleared that irrigating sugar beet using irrigation intervals of 7 or 14 days had no appreciable influence on this character. This result is in agreement with that found by Cucci and Caro (1986). A reduction in the total soluble solids percentage amounted to 2.37% was recorded by fertilizing sugar beet with 80 Kg N/fed as compared with 40 Kg N/fed in the first season corresponding to 5.92% in the second one. The effect of nitrogen fertilizer on this trait was significant only in the second season. It was observed that this character had the same response of sucrose percentage (Table 3) as affected by the used nitrogen levels. This results is in accordance with that showed by Mahmoud *et al.* (1990-b).

All the interactions between the studied factors did not affect the total soluble solids percentage in both seasons.

Purity percentage :

The data illustrated in Table 4 cleared that regardless the slight increase in purity percentage of sugar beet sown on November 1st. over that sown on November 15th. in the first and second season, this character was not significantly affected by both sowing dates. This result is in agreement with that reported by Besheet (1986). The results showed that applying irrigation water frequently at 7-day in-

Table 4. Effect of sowing dates, irrigation intervals and nitrogen fertilization level on total soluble solids (TSS) and purity percentage of sugar beet at harvest in (1995/1996 and 1996/1997) season.

Sowing dates	Irrigation Intervals	TSS %								Purity %							
		1995/1996			Average	1996/1997			Average	1995/1996			Average	1996/1997			Average
		Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)			
		40	60	80		40	60	80		40	60	80		40	60	80	
1st of November	7 days	15.50	16.00	16.00	15.83	19.50	18.85	18.60	18.98	80.65	86.70	81.25	82.86	77.15	75.60	80.83	77.86
	14 days	15.50	16.50	15.50	15.83	17.00	17.00	16.50	17.00	86.20	79.40	78.50	81.36	83.23	83.51	77.81	81.51
Average		15.50	16.25	15.75	15.83	18.50	17.92	17.55	17.99	83.42	83.05	79.87	82.11	80.19	79.55	79.32	79.69
15th of November	7 days	15.50	17.00	15.50	16.00	17.75	17.85	17.40	17.66	88.71	78.12	75.31	80.71	74.56	74.14	69.66	72.78
	14 days	17.50	18.00	15.50	17.00	18.20	17.25	16.10	17.18	76.60	77.60	81.70	78.63	72.36	71.69	73.34	72.46
Average		16.50	17.50	15.50	16.50	17.97	17.55	16.75	17.42	82.65	77.86	78.50	79.67	73.46	72.91	71.50	72.67
Interaction of IxN	7 days	15.50	16.50	15.75	15.91	18.62	18.35	18.00	18.32	84.68	82.41	78.28	81.79	75.86	74.87	75.29	75.32
	14 days	16.50	17.25	15.50	16.41	17.85	17.12	16.30	17.09	81.40	78.50	80.10	80.00	77.79	77.60	75.57	76.99
Total averge of N		16.00	16.87	15.62	16.16	18.23	17.73	17.15	17.70	83.04	80.45	79.19	80.89	76.82	76.23	75.41	76.15

L.S.D at 5% level for:				
Sowing dates (S)	NS	NS	NS	NS
Irrigation intervals (I)	NS	NS	NS	NS
Nitrogen fertilizer (N	NS	0.61	NS	NS
S xI	NS	NS	NS	NS
S xN	NS	NS	NS	NS
I x N	NS	NS	NS	NS
Sx I x N	NS	NS	7.55	NS

tervals or delaying it to 14-day ones had no statistical influence on purity percentage in both growing seasons. This result is in line with that found by Cucci and Caro (1986).

Purity percentage tended to decrease as the applied doses of nitrogen fertilizer increased from 40 to 60 and 80 Kg N/fed in the two seasons. This effect, however was not significant. This result is in harmony with that showed by El-Shafei (1991). There were no significant effects on purity percentage due to the interaction between the studied factors except that of sowing date x irrigation interval x nitrogen level in the first season.

Root diameter and length :

The results in Table 5 showed that root diameter insignificantly affected by sowing sugar beet either on November 1st or 15th in the tow growing seasons. However, it could be noticed that the first sowing date slightly surpassed the second one in respect with root diameter in both seasons. Applying irrigation water at 7 or 14-day intervals had no statistical influence on root diameter in both seasons.

Concerning nitrogen effect on root diameter, the results cleared that increasing nitrogen level gradually and significantly increased this character in the second season. Meanwhile, the differences in root diameter did not reach the level of significance in the first season. The benificial effect of nitrogen on this trait may be due to its role as an essential structural element in building plant organs. This result is in harmony with that obtined by El-Shafei (1991) There was no significant influence on root diameter could be refered to the interaction between the studied factors in both seasons.

The data collected in Table 5 showed that root length of sugar beet was insignificantly affected by the two sowing dates (November 1st. and/or 15th.) in the two growing seasons. Scheduling irrigation at intervals of 7 or 14 days had no statistical effect on root length. This result may be due to the high water holding capacity of the soil of the experimental site in Shandaweel. Increasing nitrogen level from 40 to 60 and 80 Kg/fed slightly and insignificanly increased root length in both seasons. All the possible combinations between the levels of the studied factors had no statisttical effect on root length in both seasons.

Table 5. Effect of sowing dates, irrigation intervals and nitrogen fertilization level on root length and diameter (cm) at harvest in (1995/1996 and 1996/1997) season.

Sowing dates	Irrigation Intervals	Root length								Rootdiameter							
		1995/1996			Average	1996/1997			Average	1995/1996			Average	1996/1997			Average
		Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)				Nitrogen (kg/fed)			
		40	60	80		40	60	80		40	60	80		40	60	80	
1st of November	7 days	27.50	27.75	29.30	28.18	38.65	39.65	41.15	39.81	10.48	10.51	10.57	10.52	9.65	9.95	10.77	10.12
	14 days	27.99	28.50	29.16	28.55	36.00	38.00	39.15	37.71	11.05	10.46	10.23	10.58	9.25	9.55	10.45	9.75
Average		27.74	28.12	29.23	28.36	37.32	38.82	40.15	38.41	10.76	10.49	10.40	10.55	9.45	9.75	10.61	9.93
15th of November	7 days	29.30	30.16	29.66	29.71	34.80	40.30	40.15	38.41	9.75	10.16	10.75	10.22	9.20	9.85	10.21	9.75
	14 days	29.50	29.55	29.83	29.62	37.50	38.98	37.66	38.04	10.10	9.74	11.08	10.30	9.00	9.40	10.09	9.49
Average		29.40	29.85	29.48	29.66	36.15	39.64	38.90	38.23	9.92	9.95	10.91	10.26	9.10	9.62	10.15	9.62
Interaction of IxN	7 days	28.40	28.95	29.49	28.94	36.72	39.97	40.65	39.94	10.11	10.34	10.66	10.37	9.42	9.90	10.49	9.94
	14 days	28.74	29.02	29.49	36.75	36.75	38.49	38.40	37.88	10.57	10.10	10.65	10.44	9.12	9.47	10.27	9.62
Total averge of N		28.57	28.99	29.49	29.01	36.73	39.23	39.52	38.50	10.34	10.22	10.65	10.90	9.27	9.68	10.38	9.78

L.S.D at 5% level for:				
Sowing dates (S)	NS	NS	NS	NS
Irrigation intervals (I)	NS	NS	NS	NS
Nitrogen fertilizer (N)	NS	NS	NS	0.70
S xI	NS	NS	NS	NS
S xN	NS	NS	NS	NS
I x N	NS	NS	NS	NS
Sx I x N	NS	NS	NS	NS

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تأثير ميعاد الزراعة وفترات الرى والتسميد الازوتى على محصول وجودة بنجر السكر فى مصر العليا

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اقيمت تجربتان حقليتان فى محطة بحوث شندويل بمحافظة سوهاج خلال موسمى ١٩٩٥ / ١٩٩٦ و ١٩٩٦ / ١٩٩٧ لدراسة تاثير اثنى عشر معاملة هى التوافق بين ميعادين للزراعة (١ نوفمبر ، ١٥ نوفمبر) ، فترتين للرى (الرى بعد ٧ ، ١٤ يوم) وثلاث مستويات للتسميد الازوتى (٤٠ ، ٦٠ ، ٨٠ كجم/فدان).

استخدم تصميم القطع المنشقة مرتين فى اربعة مكررات - وقد اوضحت النتائج عدم تاثر اى من الصفات المدروسة بميعادى الزراعة فيما عدا محصول الاوراق / فدان والذى زاد معنويا بتاخير ميعاد الزراعة فى الموسم الاول وقد أدت إضافة ماء الرى على فترات ٧ ايام إلى زيادة معنوية فى محصول الجذور خلال الموسم الثانى فقط وعموما لم تتجاوز هذه الزيادة ٤٪.

أدت زيادة مستوى النيتروجين حتى ٨٠ كجم نتروجين / فدان إلى زيادة قطر الجذور ومحصول الجذور زيادة معنوية فى الموسم الثانى وقد انعكس ذلك على النسبة المؤية للسكروز والتى انخفضت معنويا خلال هذا الموسم وبالتالى لم تؤد زيادة جرعة النيتروجين إلى زيادة معنوية فى محصول السكر/فدان.