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EFFECT OF SOME AGRI-PRACTICES ON YIELD AND ITS ATTRIBUTES OF SUGAR BEET

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Abstract

Two field trials were conducted at Sakha Agricultural Research Station (Kafr El-Sheikh) Governorate in two successive seasons; 1995/ 1996 and 1996/1997 to find out the effect of fertilization and harvesting date on growth traits and chemical constituents of sugar beet plants. Sugar beet variety viz. Pleno was sown during the first week of October in both seasons.

The prsented work included 24 treatments which were the combinations between two Farm Yard Manur " FYM " (with and without FYM application), three mineral N doses (without application (control) 45 kg N/fed and 90 kg N/fed) were applied as Urea 46 % N in two equal doses where the first was added after thinning 45 days from sowing and the second one was added 21 days later, two application date of Phosphours fertilizer (with land preparaion (WLP) were applied as calcium super phosphate at 15 kg/fed (15 % P2O5).and band in rows at sowing (WS) and two harvesting dates (After 180 days from sowing and after 210 days from sowing). Data indicated that

* Root fresh weight and dry matter percentage were positively increased by delaying harvest date up to 210 days from sowing.
* Adding FYM increased the values of root fresh weight/plant in the two growing seasons and increased dry matter weight percentage in the first growing seasn only.
* Application of Phosphours fertilizer with land preparation (WLP) statistically increased root fresh weight in the two growing seasons and root dry weight in the first season only.
* Prolonged growing period from 180 to 210 days attained an obvious increase in root yield amounted to 9 and 13.2 %. Increasing N levels up to 90 kg N/fed gradually and significantly increased yield.
* Traditional application of Phosphours fertilizer with land preparation produced higher root yield.
* The increment in the values of sucrose % as a result of FYM application was significant.
* Increasding N fertilizer over 45 kg N/fed declined the values of TSS % and sucrose %.

- Delaying harvest from 180 to 210 days with application of FYM attained noticeable increase in juice purity % and sugar yield.
- Both juice purity and sugar yield were significantly and positively increased by increasing the applied doses of N.
- Application of Phosphours with land preparation produced higher values in respect to juice purity and sugar yield in both growing seasons.

INTRODUCTION

The last two decades of the twentieth century showed a gradual increase in sugar consumption. Sugar beet ranks the second sugar crop not only in Egypt but also all over the world.The yield and quality of sugar beet are very much influenced by agronomic practices and . There were many factors affecting sugar beet productivity. Some of them related to theagriculture practices. Nutritional program has a direct effect on yield and quality of sugar beet crops. Nitrogen and phosphorus play a significant and direct effect on yield and quality of sugar beet roots.Under the open market conditions and the increase in the fertilizers prices, in addition to increasing in the pollution as a result of the continuous use of the artificial fertilizer, it necessary to rationlize both nitrogen and phosphorus fertilizer dose. Moreover, FYM are recommended for use. Based on that fact the conducted work was carried out to ration the quantity applied of nitrogen by using farm yard manure and to study to what extent plant age affects yield and quality of sugar beet.Also, plant age of the harvest crop has of direct effect on beet maturity and consequently the extracted sugars.

Hamoud (1992) found that applying of farmyard manure to sugar beet in clay soil increased root weight, sugar percentage and sugar yield (t./fed.) as compared with untreated soil. Koppen, *et al.* (1992) studied the effect of 0, 20 or 30 t. FYM/ha. combined with NP, NK, N, P and K or no mineral fertilizer on sugar beet . They found that average root yields ranged from 28.3 t./ha. with no fertilizer or FYM to 60.6 t. with NPK and 30 t. FYM. Leaves yield showed a similar pattern. Moreover, without FYM, sugar yields ranged from about 5 t./ha. with N alone or no mineral fertilizer to 10 t./ha. with NPK. When FYM was applied, sugar yields were similar at about 10 t./ha. for all mineral fertilizer treatments and sugar concentration was highest with PK or no mineral fertilizer. Bogdevich, *et al.* (1993) stated that application of 50 t FYM with 240 kg. N./ha. (in 3 split application 120 + 60 + 60kg/ ha) increased root yields from 66.0-66.6 to 78.1-79.6 t./ha. while the application of 100 t FYM with 180 kg. N./ha. (in 2 split

application 120 + 60 kg. N./ha.) increased root yield from 72.0-73.4 to 78.5-79.0 t./ ha.. Higher N rates gave no further significant increase. Top yields increased from 36.3-46.0 t./ha. with FYM alone to 65.3-71.0 t. with the highest N rate. Rozbicki, *et al.* (1993) planted sugar beet at spacing of 8 or 12 cm with thinning or 12 cm without thinning and given it farmyard manure+0-240 kg. N./ha. as urea. They found that root yields were increased from 39 to 46.2-48.1 organic t./ha. when nitrogen was applied with no significant differences between N. rates. Besheit, *et al.* (1995) found that N fertilizer. significantly increased fresh and dry yield of tops, roots as well as chemical and technological characters i.e., K, Na, (-amino N. concentration, total impurity and extractable sugar yield. but it reduced the sucrose and purity percentages. They concluded that the maximum root and extractable sugar yield were obtained at the rate of 69 N kg/fed, meantime applied the second dose at one month or at two months later had no effect. El-Maghraby, *et al.* (1997) revealed that increasing N. rate up to 90 kg. N./ fed. as soil application or to 1.5% N. as foliar application caused a significant increase in root length, root diameter. root and top weight per plant , total plant weight, sugar yield/plant, root and sugar yields/fed., T.S.S., Sucrose % and Purity % while root/shoot ratio significantly decreased. Hassanein (1991) in Egypt, found that harvesting after 195 days from sowing markedly increased diameter, length and weight of individual root as well as root/top ratio, root and sugar yields/fed. Sucrose and purity percentages were not affected by harvesting dates. Saif et.al. (1997) assured that delaying harvesting date reduced top, root and sugar yields as well as juice purity % by delaying harvesting date up to 200 days. Moreover , the highest sucrose % was recorded by delaying harvesting date up to 200 days from sowing .

MATERIALS AND METHODS

Two field trials were conducted at Sakha Agricultural Research Station (Kafre El-Sheikh) governorate in two successive seasons; 1995/1996 and 1996/1997 to find out the effect of fertilization and harvesting date on growth behavior and chemical constituents of sugar beet plants. Sugar beet variety viz. "Pleno" was sown during the first week of October in both seasons.

The presented work included 24 treatments which were the combination between two FYM (with and without FYM application) , two mineral nitrogen dose (With-

out application (control) 45 kg N/fed and 90 kg N/fed] two application date of phosphorus fertilizer [With land preparation (WLP) andBand in rows at sowing (WS)] and two harvesting dates (After 180 days from sowing and after 210 days from sowing).

To fix the quantity of the applied doses of nitrogen in the used FYM, the added amounts of FYM in both seasons were subjected to its N% . Based on chemical analysis of FYM, 4.0 tons FYM/fed (1.2%N) and 9.600 tons FYM/fed (0.5%N) were added at the first and second season, respectively. Nitrogen fertilizer was applied as Urea (46%N) in two equal doses where the first dose was added after thinning (45 days from sowing) and the second one added 21 days later. Phosphorus fertilization was applied as calcium super phosphate at 15 kg/fed. (15% P_2O_5). Physical and chemical properties of the experimental soil are presented in Table (1).

A split plot design with four replications was used where harvesting dates was occupied the main plots and the combinations between the FYM levels, nitrogen and phosphorus fertilization were randomly allocated in the sub-plots. A plot size was 21 m^2 consisted each 7 m long and 0.5 m width. The normal agronomic practices were done as recommended by Ministry of Agriculture in sugar beet fields.

Harvesting study

A. Growth creteria:

At harvest, a sample of 10 gurded-root was randomly taken from each treatment to determine.

Root dimentions (cm) root fresh weight (g/plant) and dry matter percentage .

B. Yield and its components:

At harvest, plants of four guarded rows were harvested, topped and the following parameters were recorded:

1. Number of roots (1000/fed) and root yield (tons/fed).
2. Top weight (g/plant) and top yield (tons/fed).

C. Juice quality and sugar yield:

A fresh weight sample of 26 g representing each treatment (ten roots) was taken to determine the following data:

*- Total soluble solids (TSS) was measured by using Hand referactometer
*- Sucrose percentage was determined by using Saccharimeter according to the procedure out lined by Le- Docte (1927).
*- Purity % was calculated according to the following equation:
*- Purity % = (Sucrose % x 100) / TSS%
*- Sugar yield per fed. was determined according to the method of Delta sugar company where approximately 3.07 % of the sucrose percentage is considered as a loss during industrial practices.

Sugar yield in tons/fed. = yield of roots in tons/fad. X adjusted sucrose percentage.

Statistical analysis:

The obtained data were subjected to the proper statistical analysis for the split - plot design according to Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Growth criteria:

Top and root yields represent the biomass of the sugar beet plant. Tops could be successfully used for animal feeding especially in summer when there is a distinct shortage in forage crops. Root yield is consicered the economical part of sugar beet plants and the final expression for the interaction effect of the internal and external factors. Moreover, growth parameters and juice quality could be good expression in respect to the expected root and sugar yield.

1. Root dimensions:

As to the influence of harvesting date, results collected in Table (2) appeared that root diameter widely increased as the harvest date prolonged from 180 to 210 days from sowing. These results were true in both growing seasons. On the contrary,

Table 1. Physical and chemical properties of the experimental soil.

Analysis	Season	
	1995/1996	1996/1997
Mechanical analysis		
Coarse sand %	1.45	1.72
Fine sand %	16.6	15.18
Silt %	20.3	19.0
Clay %	60.1	62.1
Texture	Clay	Clay
CaCO3	1.6	1.6
Chemical analysis		
Organic matter %	1.80	2.0
Available nitrogen ppm	16.25	17.3
Available phosphorus ppm (Jackson, 1958)	6.53	6.68
Available potassium ppm	290.36	274.35
Saturation Water %	60	70
PH	8.3	8.2
Ec ds/m	3.40	3.3
Cations & anions, meq/L (Chapman and Pratt, 1961)		
Na^+	6.60	6.88
K^+	0.33	0.50
Ca^{++}	2.2	2.7
Mg^{++}	2.6	2.94
HCO_3^- meq/L	6.0	6.8
Cl^-	5.6	6.00
$SO_4^=$	0.13	0.22

the resonse of root length to the prolonging of harvesting date was negatively. The relative advantage of delaying the harvest date in respect to root diameter may be attributed to increasing the accumulation of dry matter by delaying harvest. This finding is in harmony with that found by Hassanein (1991) who mentioned that root diameter increased as harvest was delayed.

In relation to the influence of fertilization and harvesting date on root dimensions at harvest, the presented data in Table (2) show that neither root diameter nor root length was significantly affected by FYM treatments. This finding was true in both seasons. However, it could be noticed that root diameter completely attained a relative advantages in its values due to FYM application.

Concerning the effect of N fertilizer on root dimensions, the available data in Table (2) revealed that both of root dimension i.e. root length and diameter, responded to N application. Root diameter statistically and gradually increased as N doses increased. However, the differences between the applied doses of N, i.e. 45 and 90 kg/fed were not enough to reach the level of significance. The pronounced effect of N fertilizer on root diameter may be due to the distinct effect of N on cell size than number of cells and consequently root diameter. This finding was described by Hassanein (1991).

In respect to Phosphours application date on root dimension, data in Table (2) cleared that both of root length and diameter positively responded to Phosphours application date. This response was significant in relation to root length, meanwhile, the response of root diameter was not enough to reach the level of significance. All the different interactions of the studied factors were insignificant in their effect on root diameter in both seasons.

2. Root fresh weight g/plant and dry matter percentage:

Results given in Table (3) clear that root fresh and dry matter % were positively increased by delaying harvest date up to 210 days from sowing. This result is in a greement with that reported by Castillo Garica and Lopez Bellido (1986).

Concerning the effect of FYM on root fresh and dry matter %, it could be noticed that adding FYM increased the values of root fresh weight % in the two growing sea-

sons and tended to increase root dry matter weight percentage in the first growing season.

Data presented in Table (3) show the distinct and the significant effect of N fertilizer. It is clearly shown that applying N element up to 90 kg N/fed increased the values of root fresh weight/plant in both seasons and root dry matter in the first season only. This finding is in accordance with that reported by Besheit, *et al.* (1995) who concluded that application of 150 kg N/fed on five equal doses significantly increased individual root weight/plant.

Concerning the phosphours effect it was of insignificant effect on root fresh weight in both seasons while it had a significant effect on dry matter in 1st season only. Application of Phosphours fertilizer with land preparation (WLP) statistically increased root fresh weight in the two growing seasons and root dry weight in the first season only.

The most effective interaction on these traits was the interaction between FYM and N fertilizer. Application of 45 kg N/fed in addition to FYM treatment produced the highest value of root dry matter %.

B. Yield and yield Components:

1. Top weight/plant and top yield/fed:

The results obtained in Table (4) cleared that harvesting date broadly affected both top weight/plant and top yield/fed. It could be noticed that delaying sugar beet harvest lowered the values of these parameters. The reduction in the values of top weight/plant and/or top yield by delaying the harvest date is mainly due to the fact that as the plant tends toward maturity, the green leaves tend to decrease. This finding was true in both seasons and in line with that found by saif, *et al.* (1997) who cleared that top yield was reduced by delaying harvesting.

Concerning the effect of F.Y.M on top weight/plant and top yield/fed at harvest, the collected data in Table (4) illustrated that both traits showed a positive and significant response in their values by adding FYM. These observations were fairly true in both seasons. This result is in agreement with that found by Bogdevich, *et al.* (1993)

who stated that top yields increased from 36.3 to 46.0 ha with FYM.

In respect to nitrogen influence on top weight/plant and top yield, data in Table (4) pointed out that both traits were markedly and significantly increased by increasing nitrogen fertilizer up to 90 Kg N/fed. These results are in agreement with that found by Rozbicki, *et al.* (1993) who cleared that leaves yield (top yield) increased with increasing nitrogen rate.

Once more, data furnished in Table (4) cleared that application date of phosphorus had no pronounced effect on top weight/plant and top yield/fed. Application of phosphorus with sowing attained a slight but significant increase in top weight/plant in the 2nd season which in turn reflected on the top yield/fed for the same season.

Interaction between the studied factors on top weight/plant and/or top yield/fed were in significant in both seasons. These results are considered a good indication for the pronounced effect of nitrogen element in its effect on these traits. This view is almost in line with that found by Koppen *et al.* (1992) who noted that leaves yield increased with application of nitrogen with 30 tons FYM/ha.

2. Root number and root yield :

Root number and root yield are the final aim for the growers to attain the maximum profit. Data presented in Table (5) show that the number of root/fed was not affected by crop age at harvest. This finding is considered an exceptional case because plant population almost tended to become stable before the harvest time. However, it could be noticed that root yield was distinctly raised by delaying harvest up to 210 days prolonged growth interval from 180 to 210 days attained an obvious increment in root yield amounted to 9.0% and 13.2%. This increment in root yield mainly due to the increase in root fresh weight/plant (Table 3). The considerable effect of delaying harvest on root yield has been recorded by Er and Inan (1989) who mentioned that six weeks delay in harvesting increased root yield by to 18 t./ha.

The results obtained in Table (5) clear that No. of root/fed. grown without FYM produced higher plant population/fed. This advantage was significant only in the 2nd season. On the other hand, root yield improved significantly by FYM application. This finding was fairly true in both seasons. This result was in accordance with that reported

by Rozbicki *et al.* (1993) Regarding the influence of nitrogen fertilizer on the number of roots/fed as well as root yield (tons/fed), the percentage of increase in root yield t./fed. in the two seasons reached 87.57% and 77.73%, respectively , compared with unfertilized treatmen. Number of roots/fed significantly decreased by increasing nitrogen levels. On the other hand, increasing nitrogen levels up to 90 Kg. N/fed. gradually and significantly increased yield by 84.34% and 77.73% compared with fertilization by 45 Kg. N/fed. The flowerished increment in root yield is mainly due to the pronounced effect on the individual root weight/plant (Table 2). These results are in agreement with those found by Toor and Bains (1994) who stated that there was a significant increase in root yield up to 120 Kg N/ha.

Concerning the effect of phosphorus fertilizer on tne number of roots/fed and root yield (tons/fed), data presented in Table (5) show that the yield of sugar beet root/fed was significant only in the second season. It could shown that application of phosphorus fertilizer with land preparation produced higher root yield.

Concerning the interaction effect of the different combination between the studied factors, results obtained cleared that the interaction between harvest date and nitrogen fertilizer was the most effective interaction. Delaying harvest interval up to 180 days and 90 Kg N/fed was necessary to produce the highest root yield.

C. Juice quality and sugar yield:

Juice quality parameters which represent the industrial side are total soluble solids percentage (TSS%), sucrose percentage and purity percentage. These parameters are widely affected by the internal and external factors. The following part will deal with the effect of the studied factors on these parameters.

1. Total soluble solids percentage (TSS%) and sucrose percentage:

The results obtained in Table (6) show that TSS% and sucrose% positively responded to the delay of harvesting date. Prolonging harvest date up to 210 days from sowing increased TSS% and sucrose% . This increment amounted to 13.24, 14.47% and 18.92% 21.50% in the 1st and 2nd season, respectively

As for the influence of FYM on TSS% and sucrose%, it is obviously shown that application of FYM attained a nigligible and insignificant increase in the values of TSS% in the first season. However, the increment in the values of sucrose% was a result of FYM application was significant. This finding was true in both seasons. On the contrary Stillingfleet (1992) concluded that sugar concentration was highest in unmanured crops.

Regarding the effect of nitrogen fertilizer on TSS% and sucrose%, the available data obviously showed that TSS % was insignificantly affected by the used nitrogen treatments. Increasing nitrogen fertilizer over 45 kg. N/fed. declined this parameter. However, sucrose percentage was improved by increasing nitrogen fertilizer up to 90 Kg. N/fed. (Table 6). The effective role of nitrogen fertilizer on sucrose percentage was described by El-Maghraby, *et al.* (1997) who stated that TSS% and sucrose% increased by increasing nitrogen application up to 90 Kg. N/fed.

Data illustrated in Table (6) clearly show that TSS % was insignificantly affected by adding phosphorus fertilizer. On the contrary, application of phosphorus fertilizer with sowing decreased the values of sucrose% significantly in the 2nd season only.

Most of the different combinations between the studied factors insignificantly affected TSS% and sucrose% values.

2. Purity percentage and sugar yield (tons/fed):

Data presented in Table (7) show that delaying harvest from 180 to 210 days considerably increased juice percentage and produced high yield of sugar per feddan. The relative advantage in juice purity percentage is mainly due to the high values of sucrose percentage (Table 6). The higher the sucrose percentage the higher the purity percentage the higher the sugar extraction. The favourable influence of delaying harvest was reported by many investigators. Albinet and Cretescu (1993) found that sugar yield increased with a long growing season.

The high yield of sugar as a result of prolonging growing season allowed the grown beet plants to receive more accumulative substance (mainly sugar), consequently increased root and sucrose concentration and improved purity. All the above mentioned statements were enough to maximize extracted sugar (sugar yield/fed).

Once more, the collected data in Table (7) indicat that application of FYM attained noticeable increase in juice purity% and sugar yield. The distinct increase in juice purity percentage was significant in both seasons, meanwhile the significant effect of FYM application on sugar yield was only in the 2nd season. This result is in agreement with that found by Hamoud (1992) who reported that applying farm yard manure to clay soil increased sugar yield (tons/fed). as compared with unfertilized soil.

Data given in table (7) clear that both juice purity and sugar yield were significantly and positively increased by increasing the applied doses of nitrogen. These findings were exactly true in the two growing seasons. The above mentioned results are in harmony with those found by El-Geddawy *et al.* (1992) who found that purity percentage tended to increase with increasing level of nitrogen. Moreover, they pointed out that N at 120 Kg/ha was the optimum for the highest sugar yield.

Concerning phosphorus effect on juice purity and sugar yield, it could be noticed that juice purity percentage was insignificantly affected by phosphorus application dates. However, sugar yields attained a significant difference in respect to phosphorus application in the 2nd season. In general, application of phosphorus with land preparation produced higher values in respect to juice purity and sugar yield in both growing seasons.

Regarding the different combination between the studied factors and its relation with juice purity percentage and sugar yield, it could be noticed that most of the interactions had no effect on these traits.

Table 2. Effect of fertilization and harvesting date on root diameter (cm) and root length (cm) of sugar beet.

Treatment			1995/1996						1996/1997					
	N	P	Root diameter (cm)			Root length (cm)			Root diameter (cm)			Root length (cm)		
	kg/fed	kg/fed	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean
Without FYM	0	*WLP	5.80	6.72	6.26	36.87	45.17	41.02	6.82	7.87	7.35	37.95	46.27	42.11
		**WS	5.0	7.80	6.45	37.75	40.30	39.02	6.12	8.90	7.51	38.62	41.47	40.85
	Mean		5.45	7.26	6.35	37.31	42.73	40.02	6.47	8.38	7.43	38.28	43.87	41.08
	45	WLP	8.22	9.95	9.08	42.57	41.40	41.98	9.00	11.07	10.03	43.67	42.57	43.12
		WS	7.82	8.22	8.02	41.78	44.62	43.25	8.85	9.32	9.08	42.95	45.77	44.36
	Mean		8.02	9.08	8.55	42.22	43.01	42.61	8.92	10.20	9.56	43.31	44.17	43.74
	90	WLP	12.27	12.75	12.51	43.82	37.75	40.78	13.32	13.45	13.53	42.67	39.15	42.41
		WS	11.85	12.52	12.18	44.05	37.62	40.83	12.90	13.60	13.25	46.42	38.67	42.55
	Mean		12.06	12.63	12.35	43.93	37.68	40.81	13.11	13.67	13.39	46.05	38.91	42.48
Mean			5.51	9.66	9.08	41.15	41.14	41.15	9.50	10.75	10.12	42.55	42.32	42.43
FYM	0	WLP	6.25	6.72	6.48	37.10	39.50	38.30	7.25	7.75	7.50	38.10	40.57	39.33
		WS	6.60	7.12	6.86	63.72	41.50	39.06	7.55	8.22	7.88	37.77	42.30	40.03
	Mean		6.42	9.92	6.67	36.91	40.45	38.68	7.40	7.98	7.69	37.93	41.43	39.68
	45	WLP	9.82	10.50	10.16	42.62	43.10	42.86	10.70	11.50	11.10	43.75	44.15	43.95
		WS	8.05	9.47	8.76	43.20	37.30	40.25	8.95	10.52	9.73	44.25	39.70	41.97
	Mean		8.93	9.98	9.46	42.91	40.20	41.55	9.82	11.01	10.41	44.00	41.92	42.96
	90	WLP	12.4	12.85	12.60	45.60	39.32	42.46	13.30	13.87	13.58	46.40	40.42	43.41
		WS	12.0	12.52	12.27	46.67	41.37	44.02	12.80	13.60	13.20	47.50	42.47	44.98
	Mean		12.2	12.68	12.43	46.13	40.35	43.24	13.05	13.73	13.39	46.95	41.45	44.20
Mean			9.18	9.86	9.52	41.98	40.33	41.16	10.09	10.91	10.50	42.96	41.60	42.28
Overall Mean	N	0	5.93	7.09	6.51	37.11	41.59	39.35	6.93	8.18	7.56	38.11	42.65	40.38
		45	8.48	9.53	9.00	42.56	41.60	42.08	9.37	10.60	9.99	43.65	43.05	43.35
		90	12.12	12.66	12.39	45.03	39.01	42.02	13.08	13.70	13.39	46.50	40.18	43.34
	P	WLP	9.12	9.91	9.51	41.43	41.04	41.23	10.06	10.97	10.51	42.59	42.19	42.39
		WS	8.57	9.61	9.09	41.71	40.73	41.07	9.52	10.69	10.11	42.92	41.73	42.32
Mean			8.89	9.76	9.30	41.57	40.74	41.15	9.79	10.83	10.31	42.75	41.96	42.35

L.S.D. at 0.05 level for:				
Harvesting date (H)	0.26	NS	0.25	NS
FYM (F)	NS	NS	NS	NS
Nitrogen (N)	0.63	NS	0.64	NS
Phosphorus (P)	NS	0.34	NS	0.32
HxF	NS	NS	NS	1.87
HxN	NS	1.89	NS	NS
HxP	NS	NS	NS	NS
FxN	NS	1.89	NS	NS
HxFxN	NS	NS	NS	NS
FxNxP	NS	2.68	NS	NS
HxFxNxP	NS	3.79	NS	NS

* WLP: With Land Preparation
** WS: Band in rows at sowing

Table 3. Effect of fertilization and harvesting date on root fresh weight (g)/plant and root dry matter (%) of sugar beet.

Treatment			1995/1996						1996/1997					
	N kg/fed	P kg/fed	Root fresh weight (g)/plant			Root dry matter (%)			Root fresh weight (g)/plant			Root dry matter (%)		
			180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean
Without FYM	0	*WLP	465.5	453.5	459.5	19.30	24.21	21.75	576.5	607.2	591.8	22.83	23.73	23.28
		**WS	483.0	445.2	464.1	20.63	22.9	21.80	587.5	598.0	592.7	22.99	24.54	23.76
	Mean		474.2	449.3	461.8	19.96	23.59	21.77	582.0	602.6	592.3	22.91	24.13	24.39
	45	WLP	647.2	603.0	625.1	20.45	23.68	22.06	736.2	782.0	759.1	22.75	23.93	23.34
		WS	610.5	656.0	633.2	21.27	22.85	22.06	652.0	728.2	690.1	23.34	25.27	24.30
	Mean		628.8	629.5	629.1	20.86	23.26	22.06	694.1	755.1	724.6	23.04	24.60	24.59
	90	WLP	908.7	938.7	923.7	20.77	25.04	22.90	1150.7	1280.7	1215.7	23.15	24.79	23.97
		WS	921.2	958.5	939.8	21.12	23.99	22.55	1174.2	1274.0	1224.1	23.92	25.06	24.49
	Mean		915.0	948.6	931.8	20.95	24.51	22.73	1162.5	1277.3	1219.9	23.53	24.92	24.54
Mean			672.7	675.8	674.2	20.59	23.79	22.19	812.8	878.3	845.6	23.16	24.55	23.85
FYM	0	WLP	464.5	553.2	508.8	20.82	23.92	22.37	649.2	661.0	655.1	22.82	24.36	23.59
		WS	460.0	489.2	474.6	20.70	22.81	21.75	573.7	641.5	607.6	22.05	24.94	23.49
	Mean		462.2	521.2	491.7	20.76	23.36	22.06	611.5	651.2	631.3	22.43	24.65	22.67
	45	WLP	643.7	677.0	660.3	21.00	23.63	22.31	768.7	896.2	832.5	21.95	24.93	22.44
		WS	651.7	610.5	631.1	20.92	24.20	22.56	705.2	917.5	811.3	22.04	24.25	23.14
	Mean		647.7	643.7	645.7	20.96	23.91	22.43	737.0	906.8	821.9	21.99	24.59	22.52
	90	WLP	989.0	940.5	964.7	21.22	23.92	22.57	1248.7	1388.2	1318.5	22.94	24.05	23.49
		WS	956.5	1019.7	988.1	20.18	21.70	20.94	1156.2	1403.0	1279.6	22.25	24.26	23.25
	Mean		972.7	980.1	976.4	20.70	22.81	21.75	1202.5	1395.6	1299.0	22.59	24.16	23.06
Mean			694.2	715.0	704.6	20.80	23.36	22.08	850.3	984.5	917.4	22.34	24.46	23.40
Overall Mean	N	0	468.2	485.3	476.7	20.36	23.47	21.92	596.7	626.9	611.8	22.67	24.39	23.53
		45	638.3	636.6	637.4	20.91	23.59	22.25	715.5	831.0	773.2	22.52	24.59	23.55
		90	943.8	964.3	954.1	20.82	23.66	22.24	1182.5	1336.5	1259.5	23.06	24.54	23.80
	P	WLP	686.4	694.3	690.3	20.59	24.06	22.33	855.0	935.9	895.4	22.74	24.30	23.52
		WS	680.5	696.5	688.5	20.80	23.08	21.94	808.1	927.0	867.6	22.76	24.72	23.74
Mean			683.4	695.4	689.4	20.70	23.57	21.82	831.6	931.4	881.5	22.75	24.51	23.63

L.S.D. at 0.05 level for:				
Harvesting date (H)	NS	0.23	61.85	0.51
FYM (F)	NS	NS	NS	0.27
Nitrogen (N)	27.96	0.29	41.33	NS
Phosphorus (P)	NS	NS	NS	NS
HxF	NS	0.33	NS	0.39
HxN	NS	NS	NS	NS
HxP	NS	0.33	NS	NS
FxN	NS	0.41	NS	0.48
HxFxN	NS	0.58	NS	NS
FxNxP	NS	0.58	NS	NS
HxFxNxP	NS	NS	NS	NS

* WLP: With Land Preparation

** WS: Band in rows at sowing

Table 4. Effect of fertilization and harvesting date on top weight (g)/plant and top yield (ton/fed) of sugar beet.

Treatment			1995/1996						1996/1997					
	N	P	Top weight (g)/plant			Top yield (ton/fed)			Top weight (g)/plant			Top yield (ton/fed)		
	kg/fed	kg/fed	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean
Without FYM	0	*WLP	47.00	35.25	41.13	1.55	1.23	1.39	87.25	76.25	81.75	2.66	2.29	2.47
		**WS	43.75	41.25	42.50	1.58	1.50	1.54	92.75	91.50	92.13	2.69	2.61	2.65
	Mean		45.38	38.25	41.81	1.56	1.37	1.46	90.00	83.88	86.94	2.67	2.45	2.56
	45	WLP	111.25	55.00	83.13	3.25	1.66	2.45	127.50	100.75	114.13	3.35	2.75	3.05
		WS	107.5	55.00	81.25	3.23	1.54	2.38	151.50	92.50	122.00	4.34	2.62	3.48
	Mean		109.38	55.00	82.19	3.24	1.60	2.42	139.50	96.63	118.06	3.84	2.68	3.26
	90	WLP	176.50	63.75	120.13	5.57	1.90	3.73	220.25	113.75	167.00	5.68	3.01	4.35
		WS	162.75	95.75	129.25	4.91	2.68	3.79	246.25	146.25	196.25	5.97	3.79	4.88
	Mean		169.63	79.75	124.69	5.24	2.29	3.76	233.25	130.00	181.63	5.82	3.40	4.61
Mean			108.13	57.67	82.89	3.35	1.75	2.55	154.25	103.50	128.88	4.11	2.85	3.48
FYM	0	WLP	51.75	55.00	53.38	1.80	1.63	1.71	106.50	93.75	100.13	4.91	2.74	2.82
		WS	60.50	28.0	44.25	2.23	0.99	1.61	110.75	72.258	91.50	3.31	2.08	2.69
	Mean		56.13	41.50	48.81	2.01	1.31	1.66	108.63	83.00	95.81	3.11	2.41	2.76
	45	WLP	111.5	52.75	82.13	3.36	1.54	2.45	150.50	95.25	122.88	3.97	2.62	3.30
		WS	109.50	58.78	84.13	3.10	1.81	2.45	132.50	113.25	122.88	3.68	2.89	3.29
	Mean		110.50	55.75	83.13	3.23	1.67	2.45	141.50	104.25	122.88	3.83	2.76	3.29
	90	WLP	236.75	74.00	155.38	7.09	2.27	4.68	316.50	131.75	224.13	7.70	3.36	5.53
		WS	194.0	105.00	149.50	5.78	2.79	4.29	250.00	158.00	204.00	6.38	3.85	5.12
	Mean		215.38	89.50	152.44	6.43	2.53	4.48	283.25	144.88	214.06	7.04	3.60	5.32
Mean			127.33	62.25	94.79	3.89	1.84	2.86	177.79	110.71	144.25	4.66	2.92	3.79
Overall Mean	N	0	50.75	39.88	45.31	1.79	1.34	1.56	99.31	83.44	91.38	2.89	2.43	2.66
		45	109.94	55.38	82.67	3.23	1.64	2.43	140.50	100.44	120.47	3.83	2.72	3.28
		90	192.50	84.63	138.56	5.84	2.41	4.12	258.25	137.44	197.84	6.43	3.50	4.97
	P	WLP	122.46	55.96	89.21	3.77	1.71	2.74	168.08	101.92	135.00	4.38	2.79	3.59
		WS	113.00	63.96	88.48	3.47	1.89	2.68	163.96	112.29	138.13	4.40	2.97	3.68
Mean			117.73	59.96	88.84	3.62	1.80	2.71	166.02	107.10	136.56	4.39	2.88	3.63

L.S.D. at 0.05 level for:				
Harvesting date (H)	28.85	0.63	19.74	0.59
FYM (F)	8.59	0.23	9.60	0.23
Nitrogen (N)	18.53	0.29	11.76	0.38
Phosphorus (P)	NS	NS	0.646	NS
HxF	NS	NS	NS	NS
HxN	14.89	0.41	NS	0.40
HxP	12.16	0.33	NS	NS
FxN	14.89	NS	23.51	NS
HxFxN	NS	NS	NS	NS
FxNxP	NS	NS	NS	NS
HxFxNxP	NS	NS	33.26	0.81

* WLP: With Land Preparation
** WS: Band in rows at sowing

Table 5. Effect of fertilization and harvesting date on root number (1000/fed) and root yield (ton/fed) of sugar beet.

Treatment			1995/1996						1996/1997					
	N	P	Root number (1000/fed)			Root yield (tons/fed)			Root number (1000/fed)			Root yield (tons/fed)		
	kg/fed	kg/fed	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean
Without FYM	0	*WLP	34.47	34.53	34.50	15.50	15.97	15.73	30.50	30.10	30.30	17.60	18.55	18.07
		**WS	35.86	36.61	36.24	16.30	15.62	15.96	28.91	29.30	29.11	16.90	17.40	17.15
	Mean		35.16	35.57	35.37	15.90	15.80	15.85	29.71	29.70	29.70	17.25	17.97	17.61
	45	WLP	29.26	30.30	29.78	18.87	19.55	19.21	26.27	27.20	26.74	19.30	21.30	20.30
		WS	30.12	27.85	28.99	18.12	19.37	18.75	28.55	28.40	28.48	18.65	20.70	19.67
	Mean		29.69	29.07	29.38	18.50	19.46	18.98	27.41	27.80	27.61	18.97	21.00	19.98
	90	WLP	31.62	29.67	30.64	28.70	32.20	30.45	25.70	26.30	26.00	29.55	33.60	31.57
		WS	30.12	28.43	29.28	27.62	31.80	29.71	24.30	25.70	25.00	28.30	32.70	30.50
	Mean		30.86	29.05	29.96	28.16	32.00	30.08	25.00	26.00	25.50	28.92	33.15	31.03
Mean			31.90	31.23	31.57	20.85	22.42	21.63	27.37	27.83	27.60	21.71	24.04	22.87
FYM	0	WLP	35.29	27.85	31.57	16.25	15.82	16.03	27.20	29.10	28.15	17.40	19.10	18.52
		WS	36.79	35.06	35.93	16.90	17.10	17.00	29.30	28.50	28.90	17.55	18.20	17.87
	Mean		36.04	31.46	33.75	16.57	16.46	16.51	28.52	28.80	28.53	17.47	18.65	18.06
	45	WLP	30.36	28.96	29.66	19.52	23.02	21.27	26.38	27.60	26.99	20.22	24.60	22.41
		WS	28.97	30.67	29.82	18.72	21.97	20.35	27.50	25.50	26.50	19.40	23.40	21.40
	Mean		29.66	29.82	29.74	19.12	22.50	20.81	26.94	26.55	26.75	19.81	24.00	21.90
	90	WLP	29.84	30.67	30.62	29.40	32.85	31.12	24.30	25.60	24.95	30.10	35.37	32.73
		WS	29.78	26.76	28.27	28.45	31.85	30.15	25.70	24.70	25.20	29.55	34.35	31.95
	Mean		29.81	28.725	29.26	28.92	32.35	30.63	25.00	25.15	25.08	29.82	34.86	32.34
Mean			31.83	29.99	30.91	21.54	32.77	22.65	26.73	26.83	26.78	22.37	25.83	24.10
Overall Mean	N	0	35.60	33.51	34.55	16.23	16.13	16.18	28.98	29.52	29.11	17.36	18.31	17.83
		45	29.67	29.44	29.56	18.81	20.98	19.89	27.18	27.18	27.18	19.39	22.50	20.94
		90	30.33	28.88	29.61	28.54	32.17	30.35	25.00	25.58	25.29	29.37	34.00	31.69
	P	WLP	31.81	30.33	31.07	21.37	23.23	22.30	26.73	27.65	27.19	22.36	25.42	23.89
		WS	31.94	30.89	31.42	21.02	22.95	21.98	27.38	27.02	27.20	21.72	24.45	23.09
Mean			31.87	30.61	31.24	21.19	23.09	22.14	27.05	27.33	27.19	22.04	24.94	23.49

L.S.D. at 0.05 level for:				
Harvesting date (H)	NS	0.67	NS	1.40
FYM (F)	NS	0.52	0.74	0.77
Nitrogen (N)	1.32	0.64	0.91	0.95
Phosphorus (P)	NS	NS	NS	0.77
HxF	NS	NS	NS	NS
HxN	NS	0.90	NS	1.345
HxP	NS	NS	NS	NS
FxN	NS	NS	NS	NS
HxFxN	NS	NS	NS	NS
FxNxP	NS	NS	NS	NS
HxFxNxP	NS	NS	NS	NS

* WLP: With Land Preparation

** WS: Band in rows at sowing

Table 6. Effect of fertilization and harvesting date on total soluble solids (T.S.S%) and Sucrose% of sugar beet.

Treatment			1995/1996						1996/1997					
	N	P	T.S.S%			Sucrose %			TSS%			Sucrose %		
	kg/fed	kg/fed	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean
Without FYM	0	*WLP	19.45	21.73	20.59	14.06	17.42	15.74	20.37	23.25	21.81	14.20	17.65	15.93
		**WS	19.48	22.25	21.11	13.76	17.20	15.48	21.30	23.30	22.30	13.44	17.32	15.38
	Mean		19.71	21.99	20.85	13.91	17.31	15.61	20.83	23.27	22.05	13.82	17.49	15.65
	45	WLP	19.30	20.95	20.13	15.07	18.50	16.78	20.35	21.97	21.16	14.97	18.74	16.86
		WS	19.30	22.73	21.01	14.56	18.72	16.64	20.52	23.25	21.88	14.37	18.91	16.64
	Mean		19.30	21.84	20.57	14.82	18.61	16.71	20.43	22.61	21.52	14.67	18.82	16.75
	90	WLP	18.83	22.00	20.41	16.08	14.31	17.69	20.35	23.75	22.05	16.09	19.72	17.91
		WS	17.95	22.25	20.10	15.85	18.72	17.28	18.82	22.72	20.77	15.69	19.62	17.65
	Mean		18.39	22.13	20.26	15.96	19.01	17.49	19.58	23.23	21.41	15.89	19.67	17.78
Mean			19.13	21.98	20.56	14.89	18.31	16.60	20.28	23.04	21.66	14.79	18.66	16.73
FYM	0	WLP	18.30	21.38	19.84	15.90	18.29	17.10	19.35	23.87	21.61	15.31	18.35	16.83
		WS	19.13	20.75	19.94	15.73	17.18	16.45	19.87	21.40	20.63	15.34	17.48	16.45
	Mean		18.71	21.06	19.89	15.81	17.73	16.77	19.61	22.63	21.12	15.37	17.92	16.64
	45	WLP	19.33	22.75	21.04	16.61	19.20	17.90	20.45	22.72	21.58	16.17	18.53	17.35
		WS	19.23	21.75	20.49	16.25	18.94	17.60	20.62	24.62	22.62	15.99	18.59	17.29
	Mean		19.28	22.25	20.76	16.43	19.07	17.75	20.53	23.67	22.10	16.08	18.56	17.32
	90	WLP	18.98	21.75	20.36	17.06	20.22	18.64	19.87	23.15	21.51	16.62	21.06	18.84
		WS	20.25	21.03	20.64	17.51	20.41	18.96	20.27	23.25	21.76	17.06	19.12	18.09
	Mean		19.61	21.39	20.50	17.28	20.31	18.80	20.07	23.20	21.63	16.84	20.09	18.46
Mean			19.20	21.57	20.38	16.51	19.04	17.77	20.07	23.17	21.62	16.10	18.86	17.48
Overall Mean	N	0	19.21	21.53	20.37	14.86	17.52	16.19	20.22	22.95	21.59	14.59	17.70	16.15
		45	19.29	22.04	20.67	15.62	18.84	17.23	20.48	23.14	21.81	15.38	18.69	17.03
		90	19.00	21.67	20.38	16.62	19.66	18.14	19.83	23.21	21.52	16.36	19.88	18.12
	P	WLP	19.03	21.67	20.39	15.79	18.82	17.31	20.12	23.12	21.62	15.56	19.01	17.29
		WS	19.30	21.79	20.55	15.61	18.53	17.07	20.23	23.09	21.66	15.33	18.50	16.92
Mean			19.17	21.78	20.47	15.70	18.67	17.18	20.18	23.10	21.64	15.44	18.76	17.10

L.S.D. at 0.05 level for:				
Harvesting date (H)	0.05	0.77	0.24	0.10
FYM (F)	NS	0.26	NS	0.34
Nitrogen (N)	NS	0.32	NS	0.42
Phosphorus (P)	NS	NS	NS	0.34
HxF	NS	0.37	NS	0.49
HxN	NS	NS	NS	NS
HxP	NS	NS	NS	NS
FxN	NS	NS	0.68	NS
HxFxN	NS	NS	NS	NS
FxNxP	NS	NS	0.96	NS
HxFxNxP	NS	NS	NS	NS

* WLP: With Land Preparation
** WS: Band in rows at sowing

Table 7. Effect of fertilization and harvesting date on purity % and sugar yield (ton/fed) of sugar beet.

Treatment			1995/1996						1996/1997					
			Purity %			Sugar yield (tons/fed)			Purity %			Sugar yield (tons/fed)		
	N kg/fed	P kg/fed	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean	180 days	210 days	Mean
Without FYM	0	*WLP	73.32	79.17	76.25	2.17	2.78	2.47	70.17	70.53	70.53	2.49	3.27	2.87
		**WS	68.76	78.34	73.55	2.24	2.68	2.47	63.49	74.34	68.92	2.27	3.01	2.63
	Mean		71.04	78.76	74.90	2.21	2.73	2.47	66.83	72.43	69.63	2.38	3.14	2.75
	45	WLP	79.06	88.16	83.62	2.84	3.61	3.22	73.68	85.65	79.67	2.88	3.99	3.42
		WS	75.71	80.89	78.31	2.63	3.62	3.12	70.22	81.60	75.91	2.68	3.91	3.27
	Mean		77.39	84.53	80.96	2.74	3.62	3.18	71.95	83.62	77.79	2.78	3.95	3.34
	90	WLP	83.76	89.29	86.53	4.61	4.60	4.62	79.47	83.20	81.33	4.75	6.62	5.65
		WS	87.64	85.31	86.48	4.37	5.95	5.16	83.57	86.33	84.95	4.44	6.41	5.38
	Mean		85.71	87.30	86.51	4.49	6.08	5.26	81.52	84.77	83.14	4.59	6.52	5.51
Mean			78.05	83.53	80.78	3.10	4.10	3.59	73.43	80.72	76.85	3.21	4.48	3.82
FYM	0	WLP	87.19	80.31	83.75	2.58	2.89	2.74	79.19	76.90	78.04	2.66	3.50	3.11
		WS	83.97	85.53	84.75	2.65	2.93	2.79	77.66	81.82	79.74	2.70	3.18	2.93
	Mean		85.58	82.92	84.25	2.61	2.91	2.76	78.42	79.36	78.89	2.68	3.34	3.01
	45	WLP	85.99	89.37	87.68	3.24	4.41	3.80	79.13	81.63	80.38	3.26	4.55	3.88
		WS	84.23	82.52	83.38	3.04	4.16	3.58	77.84	78.09	77.96	3.10	4.34	3.70
	Mean		85.11	85.95	85.53	2.14	4.29	3.69	78.48	79.86	79.17	3.18	4.45	3.79
	90	WLP	90.60	94.12	92.36	5.01	6.64	5.80	83.78	89.53	86.66	5.00	7.44	6.16
		WS	92.95	95.03	93.90	4.98	6.50	5.71	82.65	82.20	82.43	5.04	6.56	5.77
	Mean		91.78	94.57	93.18	4.99	6.57	5.75	83.22	85.87	84.54	5.02	7.00	5.96
Mean			87.49	87.82	87.65	3.55	4.52	4.02	80.04	81.70	80.87	3.60	4.87	4.21
Overall Mean	N	0	78.31	80.84	79.58	2.41	2.82	2.61	72.63	75.90	74.26	2.53	3.24	2.87
		45	81.25	85.24	83.25	2.93	3.95	3.42	75.22	81.74	78.48	2.98	4.20	3.56
		90	88.74	90.94	89.84	4.47	6.32	5.50	82.37	85.32	83.84	4.80	6.75	5.74
	P	WLP	83.33	86.74	85.03	3.37	4.37	3.86	77.57	81.24	79.40	3.47	4.83	4.13
		WS	82.21	84.61	83.41	3.28	4.25	3.75	75.90	80.73	78.00	3.32	4.52	3.90
Mean			82.77	85.67	84.22	3.32	4.31	3.80	76.74	80.99	78.86	3.40	4.67	4.01

L.S.D. at 0.05 level for:				
Harvesting date (H)	NS	0.10	NS	0.29
FYM (F)	2.25	NS	2.38	0.17
Nitrogen (N)	2.75	0.39	2.92	0.21
Phosphorus (P)	NS	NS	NS	0.17
HxF	3.18	NS	3.37	NS
HxN	NS	0.55	NS	0.30
HxP	NS	NS	NS	NS
FxN	NS	NS	4.13	NS
HxFxN	NS	NS	NS	NS
FxNxP	NS	NS	NS	NS
HxFxNxP	NS	NS	NS	NS

* WLP: With Land Preparation
** WS: Band in rows at sowing

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تأثير بعض العمليات الزراعية على محصول بنجر السكر وعلاقتها بصفات النمو والمكونات الكيماوية

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اقيمت تجربتان حقليتان بمحطة بحوث سخا الزراعية بمحافظة كفر الشيخ فى موسمين متتاليين ١٩٩٧/٩٦ و١٩٩٨/٩٧ لدراسة تأثير التسميد العضوى والنيتروجينى والفوسفاتى ومواعيد الحصاد على النمو والمكونات الكيماوية لمحصول بنجر السكر. وقد استخدم الصنف Pelino وتمت الزراعة في الاسبوع الاول من اكتوبر.

اشتملت الدراسة على ٢٤ معاملة هى التوافيق بين معاملتين سماد عضوي (اضافة سماد ، بدون اضافة) وعدد ثلاث معاملات سماد ازوتي معدني (بدون اضافة، ٤٥كجم/فدان-٩٠كجم /فدان) وميعادين حصاد (الحصاد بعد ١٨٠يوم، الحصاد بعد ٢١٠يوم) وميعادين اضافة للسماد الفوسفاتي (الاضافة أثناء الخدمة، الاضافة سرسبة مع الزراعة). وفيما يلي اهم النتائج المتحصل عليها:

- ادي تاخير مواعيد الحصاد الي ٢١٠ يوم الي استجابة موجبة في كلا من الوزن الجاف للجذر ونسبة المادة الجافة .
- ادي اضافة السماد العضوي الي زيادة قيم الوزن الغض للجذر/نبات في موسمي الدراسة، بينما ازدادت نسبة المادة الجافة فب الجذر في الموسم الاول فقط .
- ادي اطالة مدة الحصاد من ١٨٠ الي ٢١٠ يوم الي زيادة واضحة في وزن محصول الجذور قدر بنحو ٩ ، ١٣.٢ ٪ في الموسمين علي التوالي . كما ادي اضافة ٩٠ كجم نيتروجين/فدان الي زيادة معنوية في محصول الجذور .
- ادت اضافة السماد الفوسفاتي اثناء خدمة الارض الي زيادة محصول الجذور .
- إستجابة كلا من نسبة المواد الصلبة الذائبة الكلية والسكروز لتاخير ميعاد الحصاد الي ٢١٠ يوم كما ازدادت نسبة النقاوة ومحصول السكر باضافة التسميد الازوتي بمعدل ٤٥ كجم/فدان .
- ادي إضافة السماد العضوى الي زيادة معنوية في نسبة السكروز .
- ادي إضافة ٤٥ كجم/فدان الي خفض نسبة المواد الصلبة الذائبة الكلية و السكروز علي حين ادي اضافة السماد العضوي الي زيادة نسبة النقاوة ومحصول السكر .
- ادت زيادة السماد الازوتي الي زيادة معنوية في قيمة كلا من محصول الجذر السكر كما ادت اضافة السماد الفوسفاتي اثناء خدمة الارض الى زيادة قيمة كلا من نسبة النقاوة ومحصول السكر في كلا الموسمين .