FACULTY OF AGRICULTURE

Minia J. of Agric. Res. & Develop.
Vol. (28) No. 1 pp 105- 128, 2008

STUDYING THE POSSIBILITY OF SOWING SUGAR BEET IN NEWLY RECLAIMED SOILS UNDER QENA GOVERNORATE CONDITIONS

Sh. A; Mokadem[*], E. M Taha, [*];
A . M. Abou-El-Wafa[**] and O.A. Tantawy[**]
[*]Depart. of Agron., Fac. of Agric., Minia Univ.
[**] Depart. of Agron.,Fac. of Agric., South – Valley Univ.

Received 12 Jan. 2008 Accepted 17 Feb. 2008

ABSTRACT

This study was conducted during 2004/2005 and 2005/2006 seasons to study the possibility of sowing sugar beet in new reclaimed soils in Qena Governorate Suitable sowing date and optimum combination of nitrogen and potassium fertilizers, to produce the highest sugar yield and good quality were assessed.

The obtained data revealed that root length and number of leaves / plant were significantly affected by planting dates at all ages in both seasons. Early planting on (1st October) gave the maximum value of these two growth characters. The highest values of root length and number of leaves / plant were obtained with the application of 100 kg N/ fed. + 60 kg K_2O /fed.

Results showed that top, root and sugars yields were significantly affected by planting dates and NK fertilizer levels. The highest values of top, root and sugar yields/ fed. were obtained from planting beet on 1st October. and application of 100 kg N/ fed. + 40 kg K_2O / fed.

The best results with regard to T.S.S., sucrose and purity % of beets were obtained from planting on 1st October. The highest values of T.S.S and Sucrose % were obtained with the application of 80 kg N/ fed. + 40

Kg K_2O / fed. in the first season and application of 60 kg N/ fed. + 20 kg K_2O/ fed. in the second one. Purity percentage was not significant in both seasons.

INTRODUCTION

Sugar beet is the second source of sucrose all over the world. It was introduced for cultivation in the northern part of the Nile Delta in Egypt to over-come the gab between sugar consumption and production due to the increase in the population.

Recently, suggestions were made to test sugar beet productivity under Middle and Upper Egypt conditions. Furthermore, it is highly adapted to grow in poor saline soils, especially in the newly reclaimed soils in addition to its limited water requirements when compared with sugar cane.

In Northern Delta region of Egypt, sugar beet fields are usually planted during the period extended from mid September to early December and harvested from end of March to end of June. Therefore, the effects of planting dates on the performance of sugar beet with especial emphasis on root and sugar yield proved to be of vital importance.

The desirable effect of planting dates on beets root yield might be associated to seasonable environmental conditions such as temperature, relative humidity, day length and length density which allow to rapid germination, establishment vegetative growth, development and maturity. Consequently increasing dry matter accumulation and yield components as well as root yield. The improving in sugar yield may be due to the positive effect of early planting of sugar beet on fresh weight/plant, root yield and sucrose % which greatly incresed sugar production. Similar results were obtained by El- Kassaby and Leilah (1992);Azzazy (1997); Ghonema (1998); Mokadem (1999); Abdou (2000) ; Abou El-Wafa, (2001); Kandil *et al.*, (2002_a); Kandil *et al.*, (2002_b)and Mohamed (2005).

The yield and quality of sugar beet are very much influenced by agronomic practices. Some of these are related to the agronomic processes carried out by the growers.

Nitrogen and potassium are the most important elements of those supplied to sugar beet in fertilization. Nitrogen fertilizer has a pronounced effect on growth physiological and chemical characteristics of the crop so that, nitrogen caused desirable effect of sugar beet growth and yield characters. Application of NK fertilization gave the highest values of root length, root diameter, roots yield/ fed. ,top yield /fed. and sugar yield. (Azzazy 1997; Mokadem 1998; Mokadem 1999; El-Shafei 2000; Kandil *et al.*, 2002_a; Kandil *et al.*, (2002_b); Abo-Bakr 2005 ; Agami 2005 and Mohamed 2005).

The main purpose of this work was to study the possibility of planting sugar beet in new reclaimed soils in Qena Governorate. Suitable planting date and optimum combination from nitrogen and potassium fertilization, which produce the highest sugar yield and good quality were assessed.

MATERIALS AND METHODS

Two field experiments were carried out at the experimental farm of Faculty of Agriculture South –Valley University, Qena Governorate during 2004/2005 and 2005/2006 seasons.

A split plot design with four replications was used, planting dates were arranged randomly in the main plots and combination of nitrogen and potassium fertilization levels were allocated randomly in the sub-plots.

Planting dates:

a_1: October 1st. a_2: October 15th. a_3: November 1st

Nitrogen and potassium fertilization combinations:

b_1: 60 kg N/ fed. + 20 kg K_2O/fed. b_2: 60 kg N/ fed. + 40 kg K_2O/fed
b_3: 60 kg N/ fed. + 60 kg K_2O/fed b_4: 80 kg N/ fed. + 20 kg K_2O/fed
b_5: 80 kg N/ fed. + 40 kg K_2O/fed b_6: 80 kg N/ fed. + 60 kg K_2O/fed
b_7: 100 kg N/ fed. + 20 kg K_2O/fed b_8: 100 kg N/ fed. + 40 kg K_2O/fed
b_9: 100 kg N/ fed. + 60 kg K_2O/fed

Phosphorus fertilizer in the form of calcium super phosphate (15.5% P_2O_5) at rate of 15 kg P_2O_5/fed. was added at planting. Nitrogen fertilizer was applied as ammonium nitrate (33.5%) at three

equal doses i.e. the first dose was applied after thinning, the second dose was applied 15 days after and the third dose was applied after 15 days from the second dose. While, potassium sulphate (48% K_2O) was applied with the first dose of nitrogen fertilizer. Other agricultural practices of sugar beet were performed as recommended in the region.

Each sub plot consisted of five ridges, 55 cm width and 3.5 m length, which resulted area of 10.5 m^2 (1/400 fed.). The Harvesting was carried out after 180 days from planting.

The Physical and chemical analysis of the soil site are presented in Table 1.

Table 1: Some Physical and chemical properties of the soil site average for two years 2004/2005 and 2005/2006 seasons.

Property	Value
Particle size distribution	
Sand %	75
Silt %	16.6
Clay %	8.4
Soil texture	Sandy loam
Field capacity	17.5
Water saturation	31.5
pH	8.2
E.C. m mohs/ cm	4.62
Calcium carbonate	14
Organic matter (%)	0.32
Soluble cations in soil paste cmol/kg	
Na^{+2}	0.45
Ca^{+2}	0.57
K^{+}	0.19
Mg^{+2}	0.28
Soluble anions in soil paste cmol/kg	
CO_3+ HCO_3	0.28
SO_4	0.37
Cl	0.76
Total N (%)	0.05
Available P (ppm)	11.4

Studies characters:

Growth characters:

The following characters were measured on five individual plants; samples were taken randomly from each sub plots at sampling periods, i.e. 90, 120 and 150 days from planting; root length (cm). and number of leaves/plant.

Yield and its component characters:_ Complete ridge from each sub-plots was harvested, roots were cleaned separately and weighted in kg, then it was converted to estimated: top yield (ton/fed); root yield (ton/fed)and sugar yield (ton/fed.)

Juice quality:

Total soluble solids of root (T.S.S. %) were determined in the fresh root by hand refractmeter.

Sucrose percentage in fresh sugar beet roots was determined by saccharometer

Juice purity percentage was calculated according to the following equation:

$$\text{Purity \%} = \frac{\text{Sucrose \%}}{\text{T.S.S. \%}} \times 100$$

Statistical analysis was performed according to Gomez and Gomez (1984), means of significant difference between treatments were compared using L. S. D at 5% level of probability level.

RESULTS AND DISCUSSION

GROWTH CHARACTERS:

The Effect of planting dates and NK fertilization levels as well as their interactions on root length and number of leaves/ plant at different ages, i.e. 90, 120 and 150 days in 2004/2005 and 2005/2006 seasons are shown in Tables 2,3,4 and 5.

The effect of planting dates on root length and number of leaves/ plant results showed that these traits were increased with increasing growth period from 90, 120 and 150 days from sowing in both seasons, except at 90 and 150 days in the first season for root length and number of leaves/ plant, respectively. The highest values of root length and number of leaves/ plant were obtained from planting

Table 2: Effect of planting dates, NK levels and their interactions on root length (cm) at 90,120 and 150 days after planting in 2004/2005 season.

Treatments NK fertilization (kg/ fed.)	At 90 days				At 120 days				At 150 days			
	Planting dates			Mean	Planting dates			Mean	Planting dates			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	14.70	12.00	12.00	12.90	17.03	16.23	15.20	16.15	21.08	19.08	17.35	19.17
60 kg N/ fed. + 40 kg K_2O/ fed.	13.25	12.55	12.10	12.63	17.68	16.40	16.30	16.79	21.68	19.20	18.30	19.73
60 kg N/ fed. + 60 kg K_2O/ fed.	14.05	13.15	13.15	13.78	17.93	16.93	16.80	17.22	21.93	20.03	20.20	20.72
80 kg N/ fed. + 20 kg K_2O/ fed.	14.18	13.13	13.10	13.47	18.45	17.58	16.88	17.63	22.80	21.83	20.80	21.81
80 kg N/ fed. + 40 kg K_2O/ fed.	14.83	12.70	13.60	14.04	20.50	18.90	17.80	19.07	23.28	22.03	21.00	22.10
80 kg N/ fed. + 60 kg K_2O/ fed.	14.45	12.83	13.50	13.93	20.18	19.58	18.50	19.42	23.90	22.45	21.00	22.45
100 kg N/ fed. + 20 kg K_2O/ fed	14.75	14.95	13.73	14.81	21.55	20.35	18.70	20.20	24.33	23.28	25.23	24.28
100 kg N/ fed. + 40 kg K_2O/ fed	15.13	15.08	15.00	15.07	21.00	21.20	20.13	20.78	25.05	24.10	24.00	24.38
100 kg N/ fed. + 60 kg K_2O/ fed	15.45	15.33	15.10	15.29	22.33	21.78	19.80	21.30	24.40	24.30	25.33	24.68
Mean	14.53	13.52	13.48		19.63	18.77	17.79		23.16	21.81	21.47	
L.S.D 5% A=			N.S				1.22				1.27	
L.S.D 5% B=			N.S				2.17				1.83	
L.S.D 5% AB=			N.S				N.S				N.S	

Table 3: Effect of planting dates, NK levels and their interactions on root length (cm) at 90,120 and 150 days after planting in 2005/2006 seasons.

Treatments NK fertilization (kg/ fed.)	At 90 days				At 120 days				At 150 days			
	Planting dates			Mean	Planting dates			Mean	Planting dates			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	11.58	12.78	10.13	11.49	18.50	16.60	13.78	16.29	25.90	24.00	23.48	24.46
60 kg N/ fed. + 40 kg K_2O/ fed.	13.30	13.00	11.33	12.54	18.53	16.83	15.20	16.85	25.40	24.10	23.68	24.39
60 kg N/ fed. + 60 kg K_2O/ fed.	13.60	13.20	11.83	12.88	20.33	17.08	15.28	17.56	25.88	23.60	24.13	24.53
80 kg N/ fed. + 20 kg K_2O/ fed.	13.83	13.38	12.43	13.21	18.93	18.98	15.58	17.83	26.33	27.38	25.13	26.28
80 kg N/ fed. + 40 kg K_2O/ fed.	13.98	13.53	12.18	13.23	18.33	19.78	16.20	18.10	27.88	25.60	26.33	26.60
80 kg N/ fed. + 60 kg K_2O/ fed.	14.30	16.20	12.58	14.36	20.80	20.18	18.90	19.96	29.08	26.00	26.90	27.33
100 kg N/ fed. + 20 kg K_2O/ fed	14.60	14.40	13.53	14.18	17.98	21.43	20.33	19.91	27.73	28.20	27.30	27.74
100 kg N/ fed. + 40 kg K_2O/ fed	15.78	14.63	13.38	14.59	19.33	21.00	21.30	20.54	30.03	28.20	27.50	28.58
100 kg N/ fed. + 60 kg K_2O/ fed	15.38	14.78	13.78	14.64	21.00	19.93	22.18	21.03	32.28	28.18	27.68	29.38
Mean	14.04	13.99	12.35		19.30	19.09	17.64		27.83	26.14	25.79	

L.S.D 5% A=	1.22	1.13	1.53
L.S.D 5% B=	1.31	1.77	2.02
L.S.D 5% AB=	N.S	3.06	N.S

Table 4: Effect of planting dates, NK levels and their interactions on number of leaves / plant at 90,120 and 150 days after planting in 2004/2005 season.

Treatments NK fertilization (kg/ fed.)	At 90 days				At 120 days				At 150 days			
	Planting dates			Mean	Planting dates			Mean	Planting dates			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	13.75	12.00	11.00	12.25	14.50	13.75	12.75	13.67	15.75	16.00	14.75	15.50
60 kg N/ fed. + 40 kg K_2O/ fed.	13.75	11.75	11.75	12.42	15.00	14.00	12.75	13.92	16.75	17.25	15.00	16.33
60 kg N/ fed. + 60 kg K_2O/ fed.	12.75	12.75	13.25	12.92	15.50	13.75	12.50	13.92	17.25	17.00	15.50	16.58
80 kg N/ fed. + 20 kg K_2O/ fed.	13.75	12.00	11.50	12.42	16.75	14.50	13.50	14.92	17.25	17.75	15.25	16.75
80 kg N/ fed. + 40 kg K_2O/ fed.	15.00	13.25	14.00	14.08	15.75	15.50	13.75	15.00	17.75	19.00	15.75	17.50
80 kg N/ fed. + 60 kg K_2O/ fed.	14.50	14.25	12.50	13.75	16.50	14.75	12.75	14.67	17.50	19.00	17.25	17.92
100 kg N/ fed. + 20 kg K_2O/ fed	16.00	14.50	12.00	14.17	17.75	15.75	13.75	15.75	19.50	19.75	18.00	19.08
100 kg N/ fed. + 40 kg K_2O/ fed	16.00	15.25	13.75	15.00	18.75	17.00	14.75	16.83	21.50	19.50	18.75	19.92
100 kg N/ fed. + 60 kg K_2O/ fed	15.75	15.75	14.75	15.42	18.00	17.75	16.00	17.25	21.75	19.50	19.50	20.25
Mean	14.58	13.50	12.72		16.50	15.19	13.61		18.33	18.31	16.64	
L.S.D 5% A=				1.20				0.91				N.S
L.S.D 5% B=				2.12				1.86				2.25
L.S.D 5% AB=				N.S				N.S				N.S

Table 5: Effect of planting dates, levels and their interaction on number of leaves / plant at 90, 120 and 150 days after planting in 2005/2006 season.

Treatments NK fertilization (kg/ fed.)	At 90 days				At 120 days				At 150 days			
	Planting dates			Mean	Planting dates			Mean	Planting dates			Mean
	1st Oct.	15th Oct	1st Nov.		1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	11.00	11.00	8.25	10.08	21.75	19.75	19.00	20.17	25.75	25.25	22.75	24.58
60 kg N/ fed. + 40 kg K_2O/ fed.	11.75	11.25	9.75	10.92	22.00	19.00	19.75	20.25	26.25	25.75	23.00	25.00
60 kg N/ fed. + 60 kg K_2O/ fed.	15.00	11.75	11.00	12.58	19.25	20.00	20.00	19.75	27.00	24.00	23.75	24.92
80 kg N/ fed. + 20 kg K_2O/ fed.	14.00	12.25	11.25	12.50	21.25	20.25	20.00	20.50	28.25	23.75	24.75	25.58
80 kg N/ fed. + 40 kg K_2O/ fed.	14.75	13.25	11.75	13.25	25.75	21.25	20.25	22.42	28.75	27.25	24.25	26.75
80 kg N/ fed. + 60 kg K_2O/ fed.	15.75	13.75	12.25	13.92	20.75	22.00	20.75	21.17	28.00	27.00	25.75	26.92
100 kg N/ fed. + 20 kg K_2O/ fed	17.75	15.25	14.75	15.92	26.00	22.75	21.75	23.50	30.75	29.00	25.75	28.50
100 kg N/ fed. + 40 kg K_2O/ fed	16.25	15.75	16.75	16.25	25.25	23.00	22.25	23.50	32.75	30.00	26.25	29.67
100 kg N/ fed. + 60 kg K_2O/ fed	18.00	16.75	16.25	17.00	25.00	23.25	25.25	24.50	33.25	30.25	27.75	30.42
Mean	14.92	13.44	12.44		23.00	21.25	21.00		28.97	26.92	24.89	

L.S.D 5% A=	0.91	1.15	1.71
L.S.D 5% B=	1.42	1.75	2.32
L.S.D 5% AB=	N.S	N.S	N.S

beet on 1st October, while the lowest one resulted from planting on 1st November at all ages in the two seasons. The superiority of early planting (1st October) may be attributed to suitable climatic conditions for sugar beet growth. These results are in the same line with those obtained by Badawi *et al.*, (1995); Metwaly (1998) ; Abou El-Wafa (2001) and Agami (2005).

The effect of NK fertilizer combinations levels on root length and number of leaves/ plant results showed that these traits were significantly increased by increasing nitrogen and potassium fertilizer levels at all ages in both seasons, except at 90 days in the first season for root length only. The results also showed that application of N at 100 kg/ fed. + K at 60 kg K_2O/ fed. gave the highest average root length and number of leaves/ plant in both seasons. The increase in root length and number of leaves/ plant may be attributed to the role of nitrogen in activating growth of plants and role of potassium in production and translation of carbohydrates and in activating plant growth. These results are similar to those reported by Toor and Bains (1994); Badawi *et al.*, (1995); Metwaly (1998); Seleem (1998); Abou El-Wafa (2001) ; Seadh (2004) and Osman (2005).

The effect of interaction between planting dates and NK fertilization levels on root length was not significant at all ages in both seasons, except at ages 120 days in the second season only. The highest value was recorded from planting on 1st Nov. with 100 kg N/ fed. + 60 kg K_2O/ fed.

Yield characters:

Effect of planting dates and NK fertilization levels as well as their interactions on top, root and sugar yield of sugar beet at harvest in 2004 / 2005 and 2005 / 2006 seasons are shown in Tables 6 , 7 and 8 .

The effect of planting dates on top, root and sugar yield, was significant in both seasons. Data show that top, root and sugar yield (ton/fed.) increased with early planting. The maximum average (13.58 and 14.26 ton /fed.), (29.76 and 29.04 ton/ fed) and (3.518 and 2.206 ton / fed.) in the first and second seasons for top, root and sugar yield , respectively were achieved on planting sugar beet on 1st October. On the other hand, the minimum values (11.03 and 12.17 ton / fed.),

Table 6 : Effect of planting dates, NK levels and their interactions on top yield (ton/fed) in 2004/2005 and 2005/2006 seasons.

Treatments	Planting dates							
	2004/2005			Mean	2005/2006			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	11.12	7.68	8.71	9.17	9.30	8.12	7.38	8.27
60 kg N/ fed. + 40 kg K_2O/ fed.	13.87	8.30	9.70	10.62	11.04	9.66	7.51	9.40
60 kg N/ fed. + 60 kg K_2O/ fed.	16.78	12.94	8.21	12.64	13.36	12.54	10.46	12.12
80 kg N/ fed. + 20 kg K_2O/ fed.	12.10	9.70	14.23	12.01	16.73	13.79	11.79	14.10
80 kg N/ fed. + 40 kg K_2O/ fed.	11.86	9.17	8.78	9.94	15.38	13.85	12.05	13.76
80 kg N/ fed. + 60 kg K_2O/ fed.	14.62	11.64	9.10	11.78	15.99	15.22	14.32	15.18
100 kg N/ fed. + 20 kg K_2O/ fed.	12.46	14.95	8.76	12.06	15.42	15.46	15.03	15.30
100 kg N/ fed. + 40 kg K_2O/ fed	17.79	16.20	16.75	16.91	17.74	16.29	15.41	16.48
100 kg N/ fed. + 60 kg K_2O/ fed	11.65	11.40	15.01	12.69	13.34	16.56	15.54	15.15
Mean	13.58	11.33	11.03		14.26	13.50	12.17	
L.S.D 5% A=			0.54				0.70	
L.S.D 5% B=			0.82				1.38	
L.S.D 5% AB=			1.42				2.38	

Table 7 : Effect of planting dates, NK levels and their interactions on root yield (ton/fed) in 2004/2005 and 2005/2006 seasons.

Treatments	Planting dates							
	2004/2005			Mean	2005/2006			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	26.69	19.32	19.44	21.82	22.31	20.74	19.65	20.90
60 kg N/ fed. + 40 kg K_2O/ fed.	27.13	18.27	20.15	21.85	23.37	21.13	19.42	21.30
60 kg N/ fed. + 60 kg K_2O/ fed.	27.99	20.69	19.38	22.68	23.90	20.90	19.81	21.54
80 kg N/ fed. + 20 kg K_2O/ fed.	28.76	21.48	22.78	24.34	24.42	21.95	19.82	22.07
80 kg N/ fed. + 40 kg K_2O/ fed.	30.63	22.97	22.08	25.22	30.10	26.36	23.99	26.82
80 kg N/ fed. + 60 kg K_2O/ fed.	30.58	23.26	23.03	25.62	31.34	25.83	24.50	27.22
100 kg N/ fed. + 20 kg K_2O/ fed.	32.62	24.12	23.14	26.62	36.07	28.50	26.16	30.24
100 kg N/ fed. + 40 kg K_2O/ fed	31.56	27.06	27.60	28.74	37.09	31.39	28.50	32.33
100 kg N/ fed. + 60 kg K_2O/ fed	31.95	28.15	26.09	28.73	32.81	29.50	29.21	30.51
Mean	29.76	22.81	22.63		29.04	25.15	23.45	

L.S.D 5% A=	1.75	0.68
L.S.D 5% B=	2.08	1.72
L.S.D 5% AB=	N.S	N.S

Table 8 : Effect of planting dates, NK levels and their interactions on sugar yield (ton/fed) in 2004/2005 and 2005/2006 seasons.

Treatments	Planting dates							
	2004/2005			Mean	2005/2006			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	3.528	1.925	1.885	2.446	1.890	1.578	1.088	1.518
60 kg N/ fed. + 6.00 st 4.18 lbs K_2O/ fed.	3.543	2.273	2.100	2.638	1.908	1.550	1.188	1.548
60 kg N/ fed. + 60 kg K_2O/ fed.	3.023	2.678	2.193	2.631	1.910	1.648	1.270	1.609
80 kg N/ fed. + 20 kg K_2O/ fed.	3.733	2.458	2.520	2.903	1.958	1.700	1.338	1.665
80 kg N/ fed. + 40 kg K_2O/ fed.	3.655	2.990	2.355	3.000	2.208	1.903	1.223	1.778
80 kg N/ fed. + 60 kg K_2O/ fed.	4.025	2.473	2.563	3.020	2.255	1.860	1.308	1.808
100 kg N/ fed. + 20 kg K_2O/ fed	3.598	2.930	2.548	3.025	2.705	1.995	1.488	2.063
100 kg N/ fed. + 40 kg K_2O/ fed	3.380	3.513	2.635	3.176	2.623	2.113	1.558	2.098
100 kg N/ fed. + 60 kg K_2O/ fed	3.180	2.438	2.433	2.683	2.400	1.940	1.703	2.014
Mean	3.518	2.631	2.359		2.206	1.809	1.351	

L.S.D 5% A=	0.540	0.270
L.S.D 5% B=	0.310	0.250
L.S.D 5% AB=	0.539	N.S

(22.63 and 23.45 ton / fed.) and (2.359 and 1.351 ton/ fed.) in the first and second seasons for top, root and sugar yield , respectively were obtained on planting beats on 1st November.

The desirable effect of planting beets on the 1st October on root yield might be attributed to the seasonable environmental conditions during this period such as temperature, relative humidity, day length and length density which allowed rapid germination, establishment vegetative growth, development and ripening. Consequently, increasing dry matter accumulation and yield components as well as root yield per unit area. This improvement in sugar yield may be due to the positive effect of early planting of sugar beet on the 1st October on fresh weight/plant, root yield and sucrose % which greatly increased sugar production per fed. Similar results were obtained by Leila and Nasr (1992); Metwaly (1998) ;Abou El- Wafa (2001) and Mohamed (2005).

The effect of NK fertilization levels on top, root and sugar yield, it was significant in both seasons. The results showed an increase in top yield by increasing NK fertilization levels up to 100 kg N/ fed. + 40 kg K_2O/ fed. The results showed that this level gave the highest value of top, root and sugar yield . The highest values were 16.91 and 16.48 ton / fed. , 28.74 and 32.33 ton / fed. and 3.176 and 2.098 ton / fed. in the first and second seasons for top, root and sugar yield , respectively. The lowest values were obtained from application of 60 kg N/ fed. + 20 kg K_2O/ fed. in both seasons.

This enhancing in top yield/ fed. due to fertilization levels may be attributed to the role of nitrogen in stimulating top growth and causing canopy regeneration to continuous late into the season and directs photosynthesis in to production. As well as, the role of potassium on production and translocation of carbohydrates. A similar result was obtained by Besheit *et al.* , (1994); El- Attar *et al.,* (1995); Bash (1999) and Mokadem (1998)

The increase in root yield by increase fertilization levels from nitrogen and potassium may be due to their vital role in building up metabolites activating enzymes and carbohydrates accumulating which transferred from leaves to devolving roots which in turn enhanced root length and its diameter as well as root fresh weight and

root yield. Similar results were obtained by Ibrahim (1998); Mokadem (2000) and El- Maghrabi *et al.*, (1997).

The interaction effect between planting dates and NK combination levels on top yield/fed. was significant in both seasons. Planting beets on the 1st October with the application of 100 kg N/ fed. + 40 kg K_2O/ fed. gave the highest value of top yield (17.79 and 17.74 ton / fed.) in the first and second seasons, respectively.

The interaction effect between planting dates and NK fertilization levels on sugar yield was significant in the first season only. Data in Table 8 show that optimum treatment which gave the highest value of sugar yield, was by planting beets on the 1st October with the application of 80 kg N/ fed. + 60 kg K_2O/ fed. While, the lowest one was obtained by planting on 1st November with added 60 kg N/ fed. + 20 kg K_2O/ fed.

Juice quality

Effect of planting dates and NK combinations levels as well as their interactions on total soluble solids, sucrose and purity percentage of sugar beet at harvest in 2004 / 2005 and 2005 / 2006 seasons are shown in Tables 9 ,10 and 11 .

The effect of planting dates on total soluble solids and purity percentage was significant in the second season (Tables 9 and 11), while sucrose percentage was significant in both seasons (Table 10). The highest value of total soluble solids (17.08%) was obtained from planting sugar beet on the 15th October and the lowest one (15.45 %) was obtained by planting sugar beet on the 1ST November in the second season.

The highest sucrose percentage (15.05 and 10.73 %) in the first and second seasons, were obtained from planting sugar beet on the 1st October. While, the lowest one 13.57 and 8.87 % was produced from planting sugar beet on the 1st November in both seasons. The increase in sucrose percentage by early planting (1st October) could be due to the minimum accumulated night temperature in the period during production of sucrose. In addition, the favorable effect of early planting might be to the more suitable environmental conditions in this period to the formation of more sucrose. Similar results were obtained

Table 9 : Effect of planting dates, NK levels and their interactions on T.S.S.% in 2004/2005 and 2005/2006 seasons.

Treatments	Planting dates							
	2004/2005			Mean	2005/2006			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	19.85	18.62	18.97	19.15	15.73	17.07	14.70	15.83
60 kg N/ fed. + 40 kg K_2O/ fed.	19.69	19.07	19.27	19.34	15.88	17.20	14.80	15.96
60 kg N/ fed. + 60 kg K_2O/ fed.	18.59	18.31	18.51	18.47	17.00	17.20	15.20	16.47
80 kg N/ fed. + 20 kg K_2O/ fed.	20.71	19.36	17.61	19.23	17.00	17.33	15.40	16.58
80 kg N/ fed. + 40 kg K_2O/ fed.	20.80	19.66	18.80	19.75	17.07	17.60	16.33	17.00
80 kg N/ fed. + 60 kg K_2O/ fed.	19.22	19.48	18.76	19.15	15.33	17.00	16.17	16.16
100 kg N/ fed. + 20 kg K_2O/ fed.	18.94	20.69	19.57	19.73	15.38	16.97	16.20	16.18
100 kg N/ fed. + 40 kg K_2O/ fed	19.96	18.51	18.41	18.96	15.28	16.97	15.20	15.81
100 kg N/ fed. + 60 kg K_2O/ fed	18.48	17.07	17.37	17.64	15.75	16.37	15.03	15.72
Mean	19.58	18.97	18.59		16.04	17.08	15.45	

L.S.D 5% A=	N.S	0.70
L.S.D 5% B=	1.10	0.73
L.S.D 5% AB=	N.S	N.S

Table 10 : Effect of planting dates, NK levels and their interactions on sucrose % in 2004/2005 and 2005/2006 seasons.

Treatments	Planting dates							
	2004/2005			Mean	2005/2006			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	16.47	14.77	12.70	14.65	10.16	10.35	8.08	9.53
60 kg N/ fed. + 40 kg K_2O/ fed.	16.12	13.63	14.42	14.72	10.76	10.20	8.47	9.81
60 kg N/ fed. + 60 kg K_2O/ fed.	13.94	14.62	14.42	14.33	11.11	10.52	9.11	10.25
80 kg N/ fed. + 20 kg K_2O/ fed.	16.05	14.58	13.52	14.72	11.40	10.86	9.61	10.62
80 kg N/ fed. + 40 kg K_2O/ fed.	15.22	15.82	13.82	14.95	11.80	11.26	9.89	10.98
80 kg N/ fed. + 60 kg K_2O/ fed.	16.38	13.82	14.13	14.77	10.24	10.21	8.42	9.62
100 kg N/ fed. + 20 kg K_2O/ fed.	14.23	15.32	14.09	14.55	10.55	10.09	8.76	9.80
100 kg N/ fed. + 40 kg K_2O/ fed	13.83	16.08	12.62	14.18	10.15	9.81	8.54	9.50
100 kg N/ fed. + 60 kg K_2O/ fed	13.24	11.78	12.43	12.48	10.38	9.54	8.97	9.63
Mean	15.05	14.49	13.57		10.73	10.32	8.87	

L.S.D 5% A=	1.11	0.85
L.S.D 5% B=	1.93	0.87
L.S.D 5% AB=	N.S	N.S

Table 11: Effect of planting dates, NK levels and their interactions on purity % in 2004/2005 and 2005/2006 seasons.

Treatments	Planting dates							
	2004/2005			Mean	2005/2006			Mean
	1st Oct.	15th Oct.	1st Nov.		1st Oct.	15th Oct.	1st Nov.	
60 kg N/ fed. + 20 kg K_2O/ fed.	82.85	79.21	66.91	76.32	69.00	64.75	60.50	64.75
60 kg N/ fed. + 40 kg K_2O/ fed.	81.34	71.58	74.74	75.89	66.50	63.25	62.25	64.00
60 kg N/ fed. + 60 kg K_2O/ fed.	73.98	79.75	78.36	77.36	64.75	61.25	59.75	61.92
80 kg N/ fed. + 20 kg K_2O/ fed.	77.98	75.22	76.43	76.54	68.00	59.50	57.25	61.58
80 kg N/ fed. + 40 kg K_2O/ fed.	77.31	80.62	74.89	77.61	64.50	61.00	55.25	60.25
80 kg N/ fed. + 60 kg K_2O/ fed.	84.21	71.14	75.16	76.84	67.25	60.25	52.00	59.83
100 kg N/ fed. + 20 kg K_2O/ fed.	74.99	74.06	72.47	73.84	69.00	59.75	54.25	61.00
100 kg N/ fed. + 40 kg K_2O/ fed.	69.41	86.12	68.86	74.79	66.75	58.00	57.25	60.67
100 kg N/ fed. + 60 kg K_2O/ fed.	71.48	69.29	72.44	71.07	65.75	58.75	60.50	61.67
Mean	77.06	76.33	73.36		66.83	60.72	57.67	

L.S.D 5% A=	N.S	6.04
L.S.D 5% B=	N.S	N.S
L.S.D 5% AB=	11.11	N.S

by Ghandorah (1994); Badawi (1995); Metwaly (1998); Mokadem (1999) ; Abdou (2000) and Maghrabi (2001).

Planting beets on the 1st October gave the maximum values of purity percentage (66.83 %) in the second season. On the other hand, the lowest value of purity percentage (57.67 %) was obtained from planting the beets on November 1st (Table 11). The increase in purity percentage by early planting may be due to the suitable environmental conditions in this period to the formation of more photosynthesis products, translocation and accumulation sucrose in storage root. Similar results were obtained by Malic (1992); Ramdan and hassanin (1999) and Abdou (2000).

Regarding the effect of NK combinations levels on total soluble solids and sucrose percentage was significant in both seasons (Tables 9 and 10). The highest values of total soluble solids (19.75 %) and (17.0 %) were obtained from the application of 80 kg N/ fed. + 40 kg K_2O/ fed., while, the lowest values (17.64 and 15.72%) were obtained by the application of 100 kg N/ fed. + 60 kg K_2O/ fed. in both seasons. The highest values of sucrose percentage 14.95 and 10.98 were obtained from the application of 80 kg N/ fed. + 40 kg K_2O/ fed. in the first and second seasons. While, the lowest values (12.48 and 9.50 %) were obtained from the application of 100 kg N/ fed. + 60 kg K_2O/ fed. and (100 kg N/ fed. + 40 kg K_2O/ fed. in the first and second seasons, respectively. Similar results were obtained by Ramadan (1997); Mokadem (1998); Ouda,-Sohier (2001); Ramadan and Nassar (2004); Mohamed (2005) and Neamat-Alla (2005).

The effect of NK combinations levels on purity percentage was not signification in both seasons.

Moreover, the interaction effect of planting dates and nitrogen with potassium fertilization levels on purity percentage, was significant in the first season only. Data presented in Table 11 showed that the highest value of purity percentage was obtained from planting of sugar beet on the 15th October with the application of 100 kg N/ fed. + 40 kg K_2O/ fed. in the first season, and the lowest one was obtained by planting beet on 1st November with added 60 kg N/ fed. + 20 kg K_2O/ fed.

REFERENCES

Abdou, M. A. (2000): Effect of planting date, plant population and nitrogen fertilization on sugar beet productivity under the newly reclaimed sandy soil. Ph.D. Thesis, Fac. Agric., Mansoura Univ., Egypt.

Abo-Bakr, M. A. (2005): Influence of irrigation intervals, planting spaces and potassium levels on yield and quality of sugar beet Under El- Minia conditions. Ph.D. Thesis, in Agron., Fac. Agric., Minia Univ.

Abou El-Wafa, S. F. (2001): Effect of planting and harvesting dates on growth, yield and quality of sugar beet (*Beta vulgaris*). M.Sc. Thesis, Fac. of Agric., Assiut Univ., Egypt.

Agami, K. M. (2005): Effect of planting plowing depth and nitrogen fertilization on yield and quality of sugar beet. Thesis, Fac. of Agric., Cairo Univ., Egypt.

Azzazy, N. B. (1997): Effect of sowing date, irrigation interval and nitrogen fertilization on yield and quality of sugar beet under Upper Egypt condition. Egypt, J. Agric. Res., 76 (3): 1099-1113.

Badawi, M. A.; El-Agroody, M. A. and Attia, A. W. (1995): Effect of planting date and NPK fertilization on growth and yield of sugar beet (*Beta vulgaris L.*). J. Agric., Sci. Mansoura Univ., 20 (6): 2683-2689.

Basha, H. A. (1999): Response of sugar beet cultivars to level and method of nitrogen application in sandy soil. Zagazig J. Agric. Res., 26 (1): 11-26.

Besheit, S. Y.; Shehata, M. M. and El-Maghrapy, S. S. (1994): The use of nitrogen for sugar beet grown in sandy soil of Egypt. Egypt, J. Appl. Sci., 9 (12): 225-231.

El- Attar, H. A.; Darweesh, Y. A.; El-Haris, M. K. and Askar, F. A. (1995): The effect of NPK fertilization on the yield components of sugar beet at Northern Nile Delta. J. Agric. Sci., Mansoura Univ., 20 (7): 3635-3643.

El- Kassaby, A. T. and Leilah, A. A. (1992): Effect of sowing and harvesting time on yield and quality of sugar beet. Proc. 5th Conf. Agron., Zagazig Univ., (2): 963-969.

El- Maghraby, Samia, S.; Shehata, M. M. and Tawfik, H. Y. (1997): Effect of soil and foliar application of nitrogen and potassium fertilization on sugar beet. Advances in Agriculture Research, 2 (1): 163- 177.

El-Shafei, A. M. A. (2000): Effect of nitrogen and potassium fertilization on yield and quality of sugar beet in Sohag. Egypt, J. Agric. Res., 78 (2): 759-767.

Ghandorah, M. O. (1994): Effect of sowing and cultivar on sugar beet (*Beta vulgaris* L.) production in the central region Saudi Arabia. Arab Gulf J. of Scientific. Res., 12 (12): 465-478.

Ghonema, M. H. (1998): Effect of planting dates and harvesting time on yield, yield components and quality of sugar beet (*Beta vulgaris*, L.). J. Agric. Sci., Mansoura Univ., 23 (7): 2971-2979.

Gomez, K. and Gomez, A. A (1984): Statistical procedures for agricultural research. A Wiley Interscience Publication, John Wiley & Sons. Inc. New York, USA.

Ibrahim, M. F. M. (1998): The effect of some fertilization elements on the yield and quality of sugar beet. Ph. D. Thesis, Fac. Agric., Moshtohor, Zagazig Univ., Egypt.

Kandil, A. A.; Badawi, M. A.; El-Moursy, A. S. and Abdou, U. M. A. (2002_a): Effect of planting dates, nitrogen level and biofertilization treatment on: growth attributes of sugar beet (*Beta vulgaris* L.). J. Agric. Sci., Mansoura Univ., 27 (11): 7247-7255.

Kandil, A. A.; Badawi, M. A.; El-Moursy, A. S. and Abdou, U. M. A. (2002_b): Effect of planting dates, nitrogen level and biofertilization treatment on: yield, yield components and quality of sugar beet. J. Agric. Sc., Mansoura Univ., 27 (11): 7257-7266.

Leila, A. A. and Nasr S. M (1992): The contribution of sowing and harvesting dates on yield and quality of some sugar beet cultivars. Proc. 5th Conf. Agron., Zagazig Univ., 13-15 Vol. 2: 970-979.

Maghrabi, A. A. A. (2001): Effect of some agricultural practices on sugar beet Under El- Minia governorate conditions. M.Sc. Thesis, Fac. Agric., Al-Azhar Univ., Egypt.

Malic, J. (1992): Influence of sowing and harvesting dates on quality changes during storage. Proceeding of the meetings of the Scientific Committe, the sub-Committe colour and crystallization and the sub beet quality and storage held in Bratislavs Slovakia, 15-17 June, 1992. (C.F. Field Crop Abst., 47 (6): 3719, 1994.

Metwally, M. A. (1998): Effect of some agricultural practices on sugar beet. Ph. D. Thesis, Fac. Agric., Agron. Minia Univ., Egypt.

Mohamed, Y. A. M. (2005): Studies on the Effect of planting dates, planting spaces and nitrogen fertilization on yield and quality of sugar beet. M.Sc. Thesis, Fac. of Agric., Minia Univ., Egypt.

Mokadem, Sh. A. (1998): Adjusting the appropriate irrigation intervals as well as nitrogen and potassium fertilization levels for sugar beet under El- Minia conditions. Annals Agric. Sci. Moshtohor, 36 (1): 71-82.

.**Mokadem, Sh. A. (1999)**: Effect of varying sowing dates on yield and quality of some sugar beet cultivars under Minia condition. Zagazig J. Agric. Res., 26 (2): 253-266.

Mokadem, Sh. A. (2000): Effect of farmyard manure and canal sediments as well as nitrogen fertilization on productivity of sugar beet in newly reclaimed sandy calcareous soils Minia J. Agric. Res. & develop., (20): 1-20.

Neamat-Alla, E. A. E. (2005): Yield and quality of sugar beet as affected by different nitrogen and sulphur rates under clay soils. J. Agric. Sci., Mansoura Univ., 30 (12): 7255-7264.

Osman, M. A. H. (2005): Influence of nitrogen and potassium fertilization on yield and quality of two sugar beet varieties. Egypt, J. Agric. Res., 83 (3): 1237-1254.

Ouda, Sohier, M. M. (2001): Response of sugar beet N and K fertilizer level under sandy soil condition. Zagazig J. Agric. Res., 28 (2): 275-297.

Ramadan, B. S. H. (1997): Sugar beet yield and quality as affect by nitrogen and potassium fertilization. Pakistan Sugar J. 11 (1): 8-13.

Ramadan, B. S. H. and Hassanin, M. A. (1999): Effect of sowing date on yield and quality of some sugar beet (*Beta vulgaris*). J. Agric. Sci. Mansoura Univ., 24 (7): 3227-3237.

Ramadan, B. S. H. and Nassar, A. M. (2004): Effect of nitrogen fertilization on yield and quality of some sugar beet varieties. Egypt J. Agric. Res., 82 (3): 1253-1268.

Seadh, S. El (2004): Agricultural studies on sugar beet crop. Ph. D. Thesis, Fac. of Agric., Mansoura Univ., Egypt.

Seleem, E. M. E. (1998): The combined effect of salinity and NPK fertilization on sugar beet (*Beta vulgaris* L.). M. Sc. Thesis, Soil Sci., Fac. Agric., Mansoura Univ., Egypt.

Toor, S. S. and Bains (1994): Optmining nitrogen fertilization for higher yield and quality of sugar beet. Madras Agric. J., 81(12): 689–691. (C.F. Field Crop Abst.,44(5): 3336, 1996).

دراسة إمكانية زراعة بنجر السكر فى أراضى الاستصلاح الحديثة تحت ظروف محافظة قنا

شكري عبد السلام مقدم* - إيمان محمد طـه* ،
أحمد محمود أبو الوفا** - عمر عبد العظيم محمد طنطاوى**
*قسم المحاصيل - كلية الزراعة - جامعة المنيا ،
**قسم المحاصيل - كلية الزراعة - جامعة جنوب الوادي.

أجريت هذه الدراسة خلال موسمي ٢٠٠٤ / ٢٠٠٥ ، ٢٠٠٥/٢٠٠٦ لدراسة إمكانية زراعة بنجر السكر فى أراضى الاستصلاح الحديثة فى محافظة قنا لمعرفة أفضل ميعاد للزراعة والتركيبة المثلى من التسميد النيتروجينى والبوتاسى لإنتاج محصول سكر عالي وذات خصائص جودة عالية.

تشير النتائج الى ان صفتي طول الجذور وعدد الأوراق للنبات تـأثرت معنويـا بمواعيد الزراعة فى كلا الموسمين، أعطت الزراعة المبكرة فى الأول من أكتوبر اعلـي القيم لكلتا الصفتين. كما أمكن الحصول على أعلى القيم بالنسبة لطـول الجـذر وعـدد الأوراق للنبات عند التسميد بمعدل ١٠٠ كجم نيتروجين+ ٦٠ كجم بوتاسيوم للفدان.

أظهرت النتائج الى ان محصول كل من الأوراق و الجذور والسكر تأثرا معنويـا بمواعيد الزراعة ومستويات التسميد النيتروجينى والبوتاسى. أمكن الحصول على اعلي القيم من محصول كل من الأوراق و الجذر والسكر عند زراعة بنجـر الـسكر فـى أول أكتوبر وكذلك عند التسميد بمعدل ١٠٠ كجم نيتروجين+ ٤٠ كجم بوتاسيوم للفدان.

وكانت أفضل النتائج بخصوص النسبة المئوية لكل من المواد الـصلبة الكليـة الذائبة والسكروز والنقاوة عند زراعة بنجر السكر فى أول أكتوبر. كما أمكن الحـصول على أعلى القيم من النسبة المئوية للمواد الصلبة الكلية الذائبة والسكروز عنـد إضـافة ٨٠ كجم نيتروجين + ٤٠ كجم بوتاسيوم للفدان في الموسم الأول وعند إضافة ٦٠ كجم نيتروجين + ٢٠ كجم بوتاسيوم للفدان في الموسم الثاني. وكان تأثير مستويات التسميد النيتروجينى والبوتاسى على النسبة المئوية للنقاوة لم تكن معنوية في كلا الموسمين.