EFFECT OF POTASSIUM AND MAGNESIUM ON YIELD AND QUALITY OF TWO SUGAR BEET VARIETIES

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Abstract

Two field trials in a split plot design with four replications were carried out at Sakha Research Station (Kafr El-Sheikh Governorate) during 2001/2002 and 2002/2003 seasons to study the influence of potassium and magnesium fertilization on yield and quality of two sugar beet varieties. Each experiment consisted of 18-treatments repesent two varieties (Pleno and Toro), and three potassium sulfate (48% K_2O) levels zero, 24 and 48 kg K_2O/fed and three magnesium sulfate (24% MgO) levels zero, 5 and 10 kg MgO/fed. Varieties were assigned in main plots whereas the combinations betewen fertilizer treatments were destributed in subplot.

The results showed that sugar beet variety Toro significantly surpassed variety Pleno in root diameter, root fresh weight, top and root yields (tons/fed) in the 2nd one.

Potassium fertilizer attained a significant difference in root length, root diameter, root fresh weight, sucrose%, purity% and top yield (tons/fed) in both seasons.

Morover, magnesium fertilizer produed a significant effect on root length, diameter, root fresh weight, top and root yield in the 1st season.

The highest values of root (45.54 tons/fed) and sugar (8.34 tons/fed) yields resulted from the interaction between Toro variety, fertilized by 5 kg MgO/fed and 24 kg K_2O/fed in the 1st season and (43.55 tons roots/fed) and (7.9 tons sugar/fed) resulted from the interaction between Toro variety, fertilized with 5 kg MgO/fed and 48 kg K_2O/fed in the 2nd season., respectively.

INTRODUCTION

Sugar beet crop was introduced to Egypt as a complementary sugar crop to bridge the gap of sugar production amounted to 0.6 million t/year. Potassium fertilizer plays an important role in physiological processes in beet plants, where it improves juice quality and sugar yield. Magnesium fertilizer is used in different levels of fertilization to obtain the maximum yield and quality. Many investigations proved that sugar beet yield and quality differed greatly by the applied levels of potassium and magnesium fertilizers. Bizik (1993) reported that a liquid fertilizer spray containing Mg nitrate dumag, Ca, Mg nitrate or Mg nitrate + CaCl applied to sugar beet plants in early july at 80 l/ha increased sugar contents. Denesova and Andres (1995) studied the effects of K - Mg fertilizer Kamex granules, 200 kg K_2O/ha and 30 kg MgO/ha and Mg fertilizer Bittersalz, 2 applications of 2.6 kg MgO/ha on sugar beet plants. Results showed that sugar beet plants were good affected regarding sugar yield. The economic returns of Bittersalz fertilizer were higher than those resulted from Kamex granules fertilizer application. Domska (1996) found that application of 60 kg MgO/ha as soil application and foliar 2 kg MgO/ha to sugar beet plants gave the highest sugar yield and sugar contents of sugar beet plants. El-Taweel (1999) In Egypt, found that sugar beet varieties Top, Kawemira and Pleno did not differ significantly in dry weight of leaves as well as top and sugar yields/fed, sucrose%, TSS% and purity%. The variety Pleno was the highest one in this respect followed by Kawemira and Top in a descending order. Also, she found that K application from 0 to 24 and 48 kg K_2O/fed and Mg application from 0 to 9 and 18 kg MgO/fed., significantly increased leaf area index, root length, root diameter, fresh weight of sugar beet root, total soluble solids, sucrose, purity percentages, root, top and sugar yield of sugar beet plants. Saif, Laila (2000) tested four sugar beet varieties viz. Marcopoly, M 9680, M 9681 and Mito. She found significant differences among varieties in root fresh weight, sucrose, purity and root yield. Osman (2001) found that foliar spray sugar beet plants cv. Sultan with 50 and 250 ppm of K and Mg at 45, 75 and 105 days from sowing significantly improved top, root and sugar yield (tons/fed) and total soluble solids, sucrose and purity percentages of sugar beet plants. Ismail *et al.* (2002) found that sugar beet variety Kawemira recorded the highest values of root fresh weight/plant and root yield t/fed. Potassium affected significantly root fresh weight/plant, purity%, root and sugar yields in both seasons, while sucrose% significantly responded only in the 1^{st} season, while the highest top yield was recorded by application of 24 kg K_2O/fed. Osman *et al.* (2003) found that sugar beet variety Toro surpassed the other two varieties in root length and total soluble solids percentage. This work was intiated to investigate the response of yield and quality of two sugar beet cvs to different level of K and Mg.

MATERIALS AND METHODS

Two field trials in a split plot design with four replications were carried out at Sakha Research Station (Kafr El-Sheikh Governorate) during 2001/2002 and

2002/2003 seasons to study the influence of potassium and magnesium fertilization on yield and quality of two sugar beet varieties. Each experiment consisted of 18-treatments repesent two varieties (Pleno and Toro), and three potassium sulfate (48% K_2O) levels zero, 24 and 48 kg K_2O/fed and three magnesium sulfate (24% MgO) levels zero, 5 and 10 kg MgO/fed. Varieties were assigned in main plots whereas the combinations betewen fertilizer treatments were destributed in subplot.

Nitrogen fertilizer was applied in the form of Urea 46% nitrogen whereas potassium and magnesium fertilizer were added in the form of potassium and magnesium sulfate in two equal doses, the 1st application after thinning (45 days from sowing) and the 2nd dose was applied two weeks later. A fixed dose of phosphours (15 kg P_2O_5/fed) in the form of calcium superphosphate 15% P_2O_5 at the rate of 30 kg P_2O_5/fed was added at seed bed preparation. Sowing took place during the 1st week of November while harvest was done 7 months later in both seasons. Plot size was 14 m^2 (4 rows of 50 cm apart and 7 m in length). Distance between hills was 20 cm. The examined sugar beet varieties were allocated in the main plots, meanwhile, the combination between K and Mg levels were randomly distributed in the sub plots. The previous crop was Rice in both seasons. Other agricultural practices were done as recommended by Sugar Crops Research Institute. The physical and chemical analysis of the upper 30 cm of soil of the experimental site showed that the soil was clay loam containing 28.8 ppm available N, 16.38 ppm P and 420 ppm K^+. The field was kept free of weeds by pre-emergence herbicide (Pyrador 3 kg/fed).

Data recorded

At harvest, a sample of ten plants were taken at random to determine the following characters:

I- Root traits

1. Root length (cm).
2. Root diameter (cm).
3. Root fresh weight (gm).

II. Juice quality

1. Sucrose% was determined according to Le Decote (1927).

2. Purity% was calculated according to Carruthers *et al.* (1962).

Apparent purity % = Sucrose % x 100/TSS %.

III. Yield and yield components: At harvest plants of each plot for various treatments were uprooted and topped to estimate:

1. Top yield (tons/fed).

2. Root yield (tons/fed).

3. Sugar yield (tons/fed) was calculated according to the following equation:

Sugar yield (tons/fed) = Root yield x sucrose %.

The collected data were statistically analyzed according to Snedecor and Cochran (1981).

RESULTS AND DISCUSSIONS

I- Root traits

1. Root length (cm)

Results in Table (1) show that Toro variety produced higher root length (cm) compared with Pleno with insignificant differences in both seasons.

This result is in line with those reported by El- Taweel (1999) and Osman *et al.* (2003).

Results given in Table (1) reveale that root length (cm) was signifiicantly affected by Mg-fertilizer in the 1st season. Adding 10 kg MgO/fed surpassed zero and 5 kg MgO/fed by 1.91 cm, 0.63 cm in the 1st season and 1.27 cm, 0.36 cm in the 2nd season., respectively.This result concides with that reported by El- Taweel (1999).

Regarding the effect of potassium (K_2O) fertilizer levels, results showed that applying 48 kg K_2O/fed increased the root length in both seasons compared with check treatment and 24 kg K_2O/fed this increase amounted to 6.10 cm, 2.95 cm in the 1st season and 6.23 cm, 2.93 cm in the 2nd season., respectively. This increment was significant in both seasons. This result is in line with that reported by El-Taweel (1999).

Table 1. Effect of varieties, magnesium and potassium fertilizer on root length and root diameter (cm) of some sugar beet varieties at harvest in 2001/2002 and 2002/2003 seasons.

Traits	Magnesium	Root length (cm)								Root diameter (cm)							
		2001/2002 Potassium (Kg K_2O/fed)			Mean	2002/2003 Potassium (Kg K_2O/fed)			Mean	2001/2002 Potassium (Kg K_2O/fed)			Mean	2002/2003 Potassium (Kg K_2O/fed)			Mean
Varieties	Kg Mg/fed	zero	24	48		zero	24	48		zero	24	48		zero	24	48	
Pleno	0	19.80	22.14	24.10	22.01	20.95	23.31	26.24	23.50	9.80	13.14	14.10	12.34	9.62	11.98	13.57	11.72
	5	20.70	23.53	26.03	23.42	21.19	23.94	25.87	23.67	11.04	13.87	13.36	12.76	11.19	13.94	13.20	12.78
	10	20.44	24.33	27.98	24.25	21.10	24.26	27.89	24.41	11.44	13.66	13.98	13.03	12.43	13.59	13.22	13.08
Average		20.31	23.33	26.03	23.23	21.08	23.83	26.66	23.86	10.76	13.56	13.81	12.71	11.08	13.17	13.33	12.53
Toro	0	20.20	23.04	26.00	23.08	20.26	23.40	25.77	23.14	10.20	12.37	12.67	11.75	10.26	14.06	13.10	12.47
	5	20.98	24.35	27.38	24.24	21.46	24.92	28.02	24.80	11.98	14.68	13.72	13.46	11.80	13.58	14.02	13.13
	10	21.07	24.68	28.27	24.67	20.27	25.20	28.85	24.77	11.73	12.68	13.60	12.67	10.94	13.54	13.18	12.55
Average		20.75	24.02	27.22	24.00	20.66	24.51	27.54	24.24	11.31	13.24	13.33	12.63	11.00	13.73	13.43	12.72
Mg x K	0	20.00	22.59	25.05	22.55	20.60	23.35	26.00	23.32	10.00	12.76	13.38	12.05	9.94	13.02	13.34	12.10
	5	20.84	23.94	26.71	23.83	21.33	24.43	26.94	24.23	11.51	14.27	13.54	13.11	11.49	13.76	13.61	12.95
	10	20.76	24.51	28.12	24.46	20.68	24.73	28.37	24.59	11.59	13.17	13.79	12.85	11.68	13.56	13.20	12.82
Total average		20.53	23.68	26.63	23.61	20.87	24.17	27.10	24.05	11.03	13.40	13.57	12.67	11.04	13.45	13.38	12.62
L.S.D. at 5% level of significant																	
Varieties (A)					N.S				N.S				N.S				S
Magnesium (B)					1.53				N.S				0.482				N.S
Potassium (C)					0.435				0.541				0.623				0.790
A x B					N.S				N.S				0.682				N.S
A x C					N.S				0.766				N.S				N.S
B x C					0.754				0.938				N.S				N.S
A x B x C					N.S				N.S				N.S				N.S

The interaction effect in the 2nd season appeared that the maximum root length was 27.54 cm resulted from the interaction between variety Toro x 48 kg K_2O/fed in the 2nd season and MgO x K_2O in both seasons was 28.12 cm and 28.37 cm recorded from 10 kg MgO/fed and 48 kg K_2O/fed.

2. Root diameter (cm)

Results in Table (1) show that the differences between the studied varieties was insignificant with respect to root diameter (cm) in the 1st season, however, Toro variety significantly produced higher root diameter compared with Pleno in the 2nd season. This result is in line with that reported by El- Taweel (1999).

Concerning magnesium fertilizer effect on root diameter, results given show that root diameter cm, was affected by the applied doses of Mg-significantly in the 1st season amounted by adding 5 kg MgO/fed surpassed the other treatments by 13.11 and 12.95 cm., respectively. This result concides with that reported by El- Taweel (1999).

Application of 48 kg K_2O/fed produced thicker root diameter in the 1st season, and 24 kg K_2O/fed in the 2nd season. The significant increase in root diameter amounted to 13.57 cm in the 1st season and 13.45 cm in the 2nd seasons., respectively. This result is in agreement with those reported by El-Taweel (1999).

The interaction effect appeared that the maximum root diameter (13.46 cm) was resulted from the interaction between variety Toro x 5 kg MgO/fed in the 1st season.

3. Root fresh weight (g)

Results given in Table (2) indicate that Toro variety surpassed pleno in relation to root fresh weight. The increase in root fresh weight was significantly in the 2nd season only. This result is in line with those reported by El- Taweel (1999), Saif (2000) and Ismail *et al.* (2002).

Table 2. Effect of varieties, magnesium and potassium fertilizer on root fresh weight (g) and top yield (tons/fed) of some sugar beet varieties at harvest in 2001/2002 and 2002/2003 seasons.

Traits / Varieties	Magnesium Kg Mg/fed	Root fresh weight (g) 2001/2002 Potassium ($Kg\ K_2O/fed$) zero	24	48	Mean	2002/2003 Potassium ($Kg\ K_2O/fed$) zero	24	48	Mean	Top yield (tons/fed) 2001/2002 Potassium ($Kg\ K_2O/fed$) zero	24	48	Mean	2002/2003 Potassium ($Kg\ K_2O/fed$) zero	24	48	Mean
Pleno	0	1029.7	1364.0	1459.7	1284.4	1011.7	1247.7	1407.0	1222.1	12.36	16.37	17.52	15.41	12.14	14.97	16.88	14.67
	5	1153.7	1436.7	1386.3	1325.6	1169.0	1443.7	1370.3	1327.7	13.84	17.24	16.64	15.91	14.03	17.32	16.44	15.93
	10	1194.3	1416.0	1447.7	1352.7	1293.0	1409.0	1372.0	1358.0	14.33	16.99	17.37	16.23	15.52	16.91	16.46	16.30
Average		1125.9	1405.6	1431.2	1320.9	1157.9	1366.8	1383.1	1302.6	13.51	16.87	17.18	15.85	13.90	16.40	16.60	15.63
Toro	0	1070.3	1287.0	1316.7	1224.7	1075.7	1456.3	1360.0	1297.3	12.84	15.44	15.80	14.70	12.91	17.48	16.32	15.57
	5	1248.3	1518.0	1421.7	1396.0	1229.7	1408.3	1451.7	1363.2	14.98	18.22	17.06	16.75	14.76	16.90	17.42	16.36
	10	1223.3	1318.3	1410.3	1317.3	1143.7	1403.7	1368.0	1305.1	14.68	15.82	16.92	15.81	13.72	16.84	16.42	15.66
Average		1180.7	1374.4	1382.9	1312.7	1149.7	1422.8	1393.2	1321.9	14.17	16.49	16.60	15.75	13.80	17.07	16.72	15.86
Mg x K	0	1050.0	1325.5	1388.2	1254.6	1043.7	1352.0	1383.5	1259.7	12.60	15.91	16.66	15.06	12.52	16.22	16.60	15.12
	5	1201.0	1477.3	1404.0	1360.8	1199.3	1426.0	1411.0	1345.4	14.41	17.73	16.85	16.23	14.39	17.11	16.93	16.15
	10	1208.8	1367.2	1429.0	1335.0	1218.3	1406.3	1370.0	1331.6	14.51	16.41	17.15	16.02	14.62	16.88	16.44	15.98
Total average		1153.3	1390.0	1407.1	1316.8	1153.8	1394.8	1388.2	1312.2	13.84	16.68	16.89	15.80	13.85	16.74	16.66	15.75

L.S.D. at 5% level of significant	Root fresh weight 2001/2002	Root fresh weight 2002/2003	Top yield 2001/2002	Top yield 2002/2003
Varieties (A)	N.S	S	N.S	S
Magnesium (B)	48.25	N.S	0.579	N.S
Potassium (C)	62.32	79.01	0.748	0.948
A x B	68.24	N.S	0.819	N.S
A x C	N.S	N.S	N.S	N.S
B x C	N.S	N.S	N.S	N.S
A x B x C	N.S	N.S	N.S	N.S

Oncemore, the results obtained in Table (2) show that in the root fresh weight was significantly affected by magnesium fertilizer in the 1st season. However, application of 5 kg MgO/fed produced the highest value of root fresh weihght in both seasons. This result concides with that reported by El- Taweel (1999).

In regard to the influence of K_2O fertilizer treatments on root fresh weight, data showed that root fresh weight was significantly affected by application of 48 kg K_2O/fed and 24 kg K_2O/fed attained the highest value of root fresh weight being 1407.1 g and 1394.8 g/plant in the 1st and 2nd season., respectively. This result concide with that reported by El- Taweel (1999) and Ismail *et al.* (2002).

Also, variety x magnesium interaction significantly affected root fresh weight in the 1st season. The results showed that the highest root fresh weight 1396 g was recorded by Toro and 5 kg MgO/fed in the 1st season.

III. Yield and yield components

4. Top yield (tons/fed)

Results in Table (2) show that Toro variety produced heavier top yield (tons/fed) compared with Pleno with a significant differences in the 2nd season. The increase in top yield recorded by Toro over Pleno was 1.47% in the 2nd season. This result is in line with that reported by Ismaii *et al.* (2002).

Oncemore, the results obtained in Table (2) show that top yield was significantly affected by magnesium fertilizer in the 1st season, applying 5 kg MgO/fed. produced the highest values of top yield in both seasons. This result concide with that reported by Osman (2001).

Data in Table (2) show that K_2O-fertilizer level gave significant effect on top yield in both seasons. Application of 48 kg K_2O/fed recorded the highest values of top yield (16.89) in the 1st season, meanwhile, 24 kg K_2O/fed attained the highest values of top yield (16.74) in the 2nd one., respectively. This result are in agreement with that obtained by Osman (2001) and Ismail *et al.* (2002).

Results indicated that top yield was significantly affected by the interaction between variety x MgO in the 1st season. The heavier top yield being 16.75 tons/fed was recorded with Toro variety and 5 kg MgO/fed in the 1st season.

II. Juice quality

5. Sucrose %

The results in Table (3) indicate that there were insignificant influence on sucrose% due to both of varieties and/or Mg fertilizer. This result is in line with that reported by Saif, Laila (2000) (varietal effect) and Bizik (1993), Domska (1996), El-Taweel (1999) and Osman (2001) by applying Mg fertilizer.

Concerning, the effect of K_2O fertilizer levels data revealed that sucrose% was significantly affected by the applied doses of K_2O in both seasons. Application of 48 kg K_2O/fed produced the highest value of sucrose% (17.65 in the 1st season) whereas, application of 24 kg K_2O/fed was enough to attain the highest value of sucrose (17.58% in the 2nd season), respectively. This result concide with that reported by El-Taweel (1999), Osman (2001) and Ismail *et al.* (2002).

All interactions between the studies factors did not affect significantly the sucrose% in both seasons.

6. Purity %

Data given in Table (3) show that neither sugar beet varieties not Mg fertilizer insignificantly affected purity% in both seasons. This result concides with those reported by Saif, Laila (2000) and Ismail *et al* (2002) (varietal effect) and Bizik (1993), Domska (1996), El- Taweel (1999) and Osman (2001) (Mg applying).

Results in Table (3) show that K_2O fertilization significantly affected purity% in both seasons. Application of, 48 kg K_2O/fed produced higher purity% compared with check treatment and 24 kg K_2O/fed. Adding of 48 kg K/fed increased values of purity% 7.73 and 1.11% in the 1st season and 7.99 and 0.19% in the 2nd season., respectively. This result is in agreement with that reported by El- Taweel (1999), Osman (2001) and Ismail *et al.* (2002).

All interaction between the studied factors did not affect significantly the purity% in both seasons.

III. Yield and yield components

7. Root yield (tons/fed)

Data given in Table (4) cleare that Toro variety statistically surpassed Pleno variety with respect to root yield (tons/fed) in the 2nd one,however, this influence was

Table 3. Effect of varieties, magnesium and potassium fertilizer on sucrose and purity% of some sugar beet varieties at harvest in 2001/2002 and 2002/2003 seasons.

Traits	Magnesium	sucrose%								Purity% 2002/2003							
		2001/2002 Potassium ($Kg\ K_2O/fed$)			Mean	2002/2003 Potassium ($Kg\ K_2O/fed$)			Mean	2001/2002 Potassium ($Kg\ K_2O/fed$)			Mean	20002/2003 Potassium ($Kg\ K_2O/fed$)			Mean
Varieties	Kg Mg/fed	zero	24	48		zero	24	48		zero	24	48		zero	24	48	
Pleno	0	12.71	17.09	18.24	16.01	12.55	16.80	18.18	15.84	71.48	80.89	82.39	78.25	71.28	84.16	84.42	79.95
	5	13.91	16.55	17.19	15.88	14.38	17.85	17.41	16.55	73.02	75.64	80.42	76.36	74.89	81.36	82.05	79.43
	10	14.69	17.46	17.60	16.58	15.63	17.89	17.24	16.92	75.59	80.50	80.14	78.74	76.50	82.88	81.23	80.20
Average		13.77	17.03	17.68	16.16	14.19	17.51	17.61	16.44	73.36	79.01	80.98	77.79	74.22	82.80	82.56	79.86
Toro	0	13.80	17.46	17.83	16.36	13.43	18.06	17.41	16.30	75.85	85.72	86.23	82.60	73.57	81.82	82.49	79.29
	5	14.81	18.28	17.51	16.87	14.75	17.27	17.68	16.57	74.08	80.58	80.55	78.40	74.39	80.04	80.31	78.25
	10	14.71	16.74	17.53	16.33	14.13	17.62	17.51	16.42	74.52	80.96	81.16	78.88	74.64	81.83	82.73	79.73
Average		14.44	17.49	17.63	16.52	14.10	17.65	17.53	16.43	74.82	82.42	82.65	79.96	74.20	81.23	81.84	79.09
Mg x K	0	13.26	17.28	18.04	16.19	12.99	17.43	17.80	16.07	73.67	83.30	84.31	80.43	72.43	82.99	83.45	79.62
	5	14.36	17.41	17.35	16.38	14.57	17.56	17.55	16.56	73.55	78.11	80.49	77.38	74.64	80.70	81.18	78.84
	10	14.70	17.10	17.57	16.46	14.88	17.75	17.38	16.67	75.05	80.73	80.65	78.81	75.58	82.35	81.98	79.97
Total average		14.11	17.26	17.65	16.34	14.15	17.58	17.57	16.43	74.09	80.71	81.82	78.87	74.21	82.01	82.20	79.48
L.S.D. at 5% level of significant																	
Varieties (A)					N.S				N.S				N.S				N.S
Magnesium (B)					N.S				N.S				N.S				N.S
Potassium (C)					0.73				0.689				2.14				1.66
A x B					N.S				N.S				N.S				N.S
A x C					N.S				N.S				N.S				N.S
B x C					N.S				N.S				N.S				N.S
A x B x C					N.S				N.S				N.S				N.S

insignificantly in the 1st season. This result is in line with those reported by Saif, Laila (2000) and Ismail *et al.* (2002).

The effect of magnesium fertilizer on root yield appared a significant influence in the 1st season on root yield. This result concides with that reported by Osman (2001).

Regarding the effect of potassium fertilizer on root yield, it could be noted a significantly increase in this trait in both seasons, application of 48 kg K_2O/fed attained the highest value of root yield 42.21 in the 1st season whereas application of 24 kg K_2O/fed attained the highest value of root yield 41.84 in the 2nd season., respectively. This result is in line with that reported by El-Taweel (1999) and Osman (2001).

Results indicated that root yield was significantly affected by the interaction between variety x MgO in the 1st season. The highest root yield was (41.88 tons/fed) was recorded with Toro variety and 5 kg MgO/fed in the 1st season.

8. Sugar yield (tons/fed)

Neither sugar beet varieties nor magnesium fertilizer levels attained a significant effect on sugar yield/fed. However, it could be noticed that application of 5 kg MgO/fed attained a negligible increase in sugar yield compared with check treatment and/or 10 kg MgO/fed. This result is in line with that reported by Ismail *et al.* (2002) (varietal effect) and Denesova and Andres (1995), Domska (1996) and El-Taweel (1999) and Osman (2001) (Mg applying).

Results given in Table (4) show that sugar yield was significantly affected by the applied of K_2O in both seasons. Application of 48 kg K_2O/fed produced the highest value of sugar yield 7.47 tons/fed in the 1st season whereas, application of 24 kg K_2O/fed produced the highest value of sugar yield 7.39 tons/fed in the 2nd season. This result concides with that reported by El- Taweel (1999), Osman (2001) and Ismail *et al.* (2002).

The various interactions between the studied factors did not affect significantly the sugar yield in both seasons.

Table 4. Effect of varieties, magnesium and potassium fertilizer on root yield and sugar yield (tons/fed) of some sugar beet varieties at harvest in 2001/2002 and 2002/2003 seasons.

Traits		Root yield (tons/fed)								Sugar yield (tons/fed)							
	Magnesium	2001/2002 Potassium (Kg K_2O/fed)			Mean	2002/2003 Potassium (Kg K_2O/fed)			Mean	2001/2002 Potassium (Kg K_2O/fed)			Mean	2002/2003 Potassium (Kg K_2O/fed)			Mean
Varieties	Kg Mg/fed	zero	24	48		zero	24	48		zero	24	48		zero	24	48	
Pleno	0	30.89	40.92	43.79	38.53	30.35	37.43	42.21	36.66	3.93	6.99	8.03	6.32	3.81	6.29	7.69	5.93
	5	34.61	43.10	41.59	39.77	35.07	43.31	41.11	39.83	4.83	7.14	7.16	6.38	5.06	7.76	7.18	6.67
	10	35.83	42.48	43.43	40.58	38.79	42.27	41.16	40.74	5.26	7.46	7.66	6.79	6.09	7.59	7.13	6.94
Average		33.78	42.17	42.94	39.63	34.74	41.00	41.49	39.08	4.67	7.20	7.62	6.50	4.99	7.21	7.33	6.51
Toro	0	32.11	38.61	39.50	36.74	32.27	43.69	40.80	38.92	4.43	6.75	7.08	6.08	4.34	7.90	7.14	6.46
	5	37.45	45.54	42.65	41.88	36.89	42.25	43.55	40.90	5.57	8.34	7.49	7.13	5.47	7.32	7.71	6.83
	10	36.70	39.55	42.31	39.52	34.31	42.11	41.04	39.15	5.40	6.63	7.42	6.47	4.85	7.48	7.20	6.51
Average		35.42	41.23	41.49	39.38	34.49	42.68	41.80	39.66	5.13	7.24	7.33	6.57	4.89	7.56	7.35	6.60
Mg x K	0	31.50	39.77	41.65	37.64	31.31	40.56	41.51	37.79	4.18	6.87	7.56	6.20	4.07	7.09	7.42	6.19
	5	36.03	44.32	42.12	40.82	35.98	42.78	42.33	40.36	5.20	7.74	7.33	6.76	5.27	7.54	7.45	6.75
	10	36.27	41.02	42.87	40.05	36.55	42.19	41.10	39.95	5.33	7.04	7.54	6.64	5.47	7.53	7.17	6.72
Total average		34.60	41.70	42.21	39.50	34.61	41.84	41.65	39.37	4.90	7.22	7.47	6.53	4.94	7.39	7.34	6.56
L.S.D. at 5% level of significant																	
Varieties (A)					N.S				S				N.S				N.S
Magnesium (B)					1.45				N.S				N.S				N.S
Potassium (C)					1.87				2.37				0.592				0.671
A x B					2.05				N.S				N.S				N.S
A x C					N.S				N.S				N.S				N.S
B x C					N.S				N.S				N.S				N.S
A x B x C					N.S				N.S				N.S				N.S

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تأثير التسميد بالبوتاسيوم والماغنسيوم على محصول وجودة صنفين من بنجر السكر

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أقيمت تجربتان حقليتان بمحطه البحوث الزراعيه بسخا بمحافظه كفر الشيخ لدراسه تأثير الاضافة الارضية للتسميد بالماغنسيوم والبوتاسيوم على محصول وجوده بنجر السكر خلال موسمى الزراعه ٢٠٠١/٢٠٠٢ و ٢٠٠٢/٢٠٠٣ وقد إشتملت الدراسه على صنفين من اصناف بنجر السكر عديد الاجنة تورو و بلينو وثلاثة معدلات من التسميد الماغنسيوم صفر و ٥ و ١٠ كجم اكسيد ماغنسيوم مغ أ للفدان وثلاثة مستويات من التسميد بعنصر البوتاسيوم صفر و ٢٤ و ٤٨ كجم بوتاسيوم بو٢أ للفدان ووزعت المعاملات فى تصميم قطع منشقه مره واحده فى أربع مكررات حيث وضعت الاصناف فى القطع الرئيسيه والتفاعل بين مستويات التسميد فى القطع الشقية.

أوضحت النتائج المتحصل عليها:

١- تفوق الصنف تورو على الصنف بلينو معنويا فى الصفات التالية: قطر الجذر ووزن الجذر الطازج ومحصولى العرش والجذر فى الموسم الثانى فقط.

٢- أوضحت النتائج تفوق معاملات التسميد بعنصر الماغنسيوم مغ أ معنويا فى الصفات التالية: طول الجذر وقطر الجذر ووزن الجذر الطازج ومحصولى العرش والجذر فى الموسم الاول فقط.

٣- أوضحت النتائج تفوق معاملات التسميد بعنصر البوتاسيوم بو٢أ معنويا فى كلا الموسمين فى الصفات التالية: طول الجذر و قطر الجذر ووزن الجذر الطازج والسكروز والنقاوة ومحصول العرش.

٤- اوضحت النتائج ان احسن محصول من الجذور (٤٥,٥٤ طن للفدان) نتج من التفاعل بين الصنف تورو مع اضافة المعدل ٥ كجم اكسيد ماغنسيوم مغ أ للفدان و ٢٤ كجم اكسيد بوتاسيوم بو٢أ للفدان فى الموسم الاول بينما كان فى الموسم الثانى (٤٣,٥٥ طن للفدان) نتج من التفاعل بين الصنف تورو و ٥ كجم اكسيد ماغنسيوم مغ أ للفدان و ٤٨ كجم اكسيد بوتاسيوم بو٢أ.

٥ – اوضحت النتائج ان احسن محصول من السكر (٨,٣٤ طن للفدان) نتج من التفاعل بين الصنف تورو مع اضافة المعدل ٥ كجم اكسيد ماغنسيوم مغ أ للفدان و ٢٤ كجم اكسيد بوتاسيوم بو٢أ للفدان فى الموسم الاول بينما كان فى الموسم الثانى (٧,٩٠ طن للفدان) نتج من التفاعل بين الصنف تورو ومعاملة الكونترول للماغنيسيوم مغ أ و ٢٤ كجم بوتاسيوم بو٢أ للفدان.