Egypt. J. Agric. Res., 81 (4), 2003.

EFFECT OF FERTILIZATION ON CHEMICAL COMPOSITIONS AND JUICE QUALITY OF SUGAR CANE

EL-GEDDAWY, I.H.[1], M.A.M. RIZK[2], M.G.A. TAHA[2] AND M.S.H. OSMAN[1]

1 Agric. Res. Centre (ARC) Sugar Crops Research institute (SCRI).

2 Agron. Dept. Fac. Agric. AL-Azhar Univ.

(Manuscript received 22 December 2002)

Abstract

The present work was conducted for two successive seasons, i.e. 1996 /1997 and 1997 /1998 at Shandaweel Research Station, Agricultural Research Centre, Sohag Governorate. The aim of the study is to investigate the effect of biofertlizer on growth characters, chemical components, juice quality, yield and yield components of sugar cane varieties.The experiments included 18 treatments which were the combination between two sugar cane varieties (G.T.54-9 and G.85-37) and nine fertilization treatments: 180 kg N /fed.,120 kg N / fed., 60 kg N / fed., inoculation with *Azotobacter* +60 kg N /fed., or +120 kg / fed., inoculation with *Azospirillum* +60 kg/fed., inoculation with *Azospirillumm* +120 kg / fed., inoculation with *Azotobacter* only and inoculation with *Azospirillum* only.

Azotobacter chrooccocum and *Azospirillum brasilense* were obtained from soil, water and environmental research institute, agricultural research center Giza.

Exprimental treatments were arranged in complete randomized block design with four replications. A combined analysis for the two season was done. The important results could be summarized in the following:

*-Sugar cane varieties had no significant effect on N % ,Na % , Brix % and sucrose % , however, K % , purity % ,and sugar recovery were significantly affected by the examined varieties. The lower value of fiber % was recorded with the commercial variety "G.T.54-9".

*-Application of biofertilizer sources i.e *Azotobactor* and *Azosprillum* with 120 kg.N/fed. improved N % and recorded the lowest value of K % and appropriate of fiber % . The highest value of sugar recovery (12.33 % and 12.23)was recorded by applying 180 kg.N /fed. inculated seed setts by *Azotobacter chrooccocum* + 60 kg.N /fed respectively, however, effect of nitrogen sources on Na % , K % , Brix %, Reducing sugar % , Sucrose % and purity was insignificant.

INTRODUCTION

The long term crops like sugar cane requires large amount of nitrogen which represents 30 to 40 percent of the total cost of cultural practices. Therefore, synthetic fertilizers play a major role in meeting plant demand for nitrogen. The cost of nitrogenous fertilizer increased day after day; hence it becomes imperative to substitute or decrease nitrogen fertilizer (inorganic nitrogen) by some other cheap and softy sources which can at least partially, meet the crop requirements. Recently, nitrogen fixation by microbes in sugar cane fields has been established, which effectively supplement the need of nitrogen and reduce the cost of production via, reducing doses of nitrogenous fertilizer. And because it is well Known that there is a close relationships between the applied quantities of nitrogen element and juice quality , the present work will consider the relative advantage of the various combinations of nitrogen sources on quality measurements of two sugar cane varieties. Arvind and Mohan (1990), indicated that 75 % N of recommended dose (112.5 kg N/ha.) either with sett inoculated through soil application of *Azospirillum* or *Azotobacter* recorded that juice quality was not altered by fertilizer treatments. Hence 25 % of inorganic nitrogen (37.5 kg N/ha.)could be saved by the use of these bio-fertilizers. Bangar, *et al.* (1994), mentioned that sugar cane cvs. Co.7318 was given 0-300 kg N/ha. and 0-6 ton press mud cake/ha. or 4 ton press mud + inoculation with *Azotobacter* 30 and 60 days after planting. They added that cane quality, Brix %, sucrose %, purity %, sugar concentration, fiber and ash % decreased with increasing N converse true for increasing press mud cake rate. Muthukumarasamy, *et al.* (1994), found that when these bacteria were used as a biofertilizer for sugar cane with 50 % reduction in N fertilizer, there was a marginal increase in sugar recovery. Gonzalez, *et al.* (1995), studied the effect of inoculation with *Azospirillum* and three levels of nitrogen in sugar cane (*Saccharum offcinarum*) C 266-70 in vitro. They found that culture in presence of 25 % of maximum NH4 and K with inoculation increased soluble protein content of plantlets by 63.7 % compared with the average values for other cultures. El-Sayed (1996), noticed that the increase in N level did not significantly influence N, Na, and K content in stem at harvest. Thakur and Singh (1996), found that cane juice quality was not significantly affected with biofertilizers. However, they noticed that biofertilizers had an important role in the utilization of N by sugar cane through higher biological N fixation and increasing the availability

and uptake of N. Ahmed (1998), demonstrated that sucrose % was significantly affected by nitrogen levels in second plant crop. Also, found that recieved 210 kg N/fed., gave the highest total soluble solids in two plant crops, while in the first ratoon crop,the highest value was obtained by 180 kg N/fed. Moreover, he added that Brix % was significantly affected by nitrogen. The highest value was obtained when the plants received 180 kg N/fed. in the first plant and ratoon crops, while in the second season plant crop receiving 210 kg N/fed. gave the highest Brix %. On the other hand, he noticed that increasing nitrogen levels significantly increased N %, Na % and K % in stalk at harvest. El-Sayed (1996), showed that Brix %, sucrose % and sugar recovery % of F.153 and G.74-96 varieties were not significantly affected. F.153 gave the highest values of purity, TSS % and lowest reducing sugar.

El-Geddawy *et al.* (1997), noticed that fiber percentage was significantly affected by varieties. However, they added that Brix percentage was significantly responded to varietal differences. On the other hand, they found that the used varieties did not reach the level of significant in relation to reducing sugar percentage. Ahmed (1998), demonstrated that G.T.54-9 variety gave the highest values of Brix and sucrose percentages in the first plant crop, while, G.75-368 gave the highest sugar recovery percentage and in the second plant crop and first ratoon crop. On the other hand, he added that the highest value of purity percentage was recorded by G.87-55 variety. Morever, he found that the varieties had significant effect on N% in first plant crop and ratoon crop, Na% in two plant crops and first ratoon crops and K% in first and second plant crops in stem at harvest.

MATERIALS AND METHODS

The present work was conducted for two successive seasons, i.e. 1996 /1997 and 1997 /1998 in Shandaweel Research Station, Agricultural Research Center, Sohag Governorate.

The main object of the present study is to invistigate the effect of biofertlizer on growth characters, chemical components, juice quality, yield and yield components of some sugar cane varieties.This experiment included 18 treatments which were the combination between two sugar cane varieties (G.T.54-9 "the commercial variety" and

G.85-37 "the new promising variety") and nine fertilization treatments: 180 kg N / fed.,120 kg N / fed., 60 kg N / fed., inoculation with *Azotobacter* + 60 kg N /fed., inoculation with *Azotobacter* +120 kg / fed., inoculation with *Azospirillum* +60 kg/fed., inoculation with *Azospirillumm* +120 kg / fed., inoculation with *Azotobacter* only and inoculation with *Azospirillum* only.

Azotobacter chrooccocum and Azospirillum brasilense were obtained from soil,water and environmental research institute, agricultural research center Giza.

Exprimental treatments were arranged in complete randomized block design with four replications. Plot area was 42 m^2 containing six rows, 7m in length and 1m in width. planting dates were on the 3rd week of March in both seasons. Each furrow consists of 28 buds. At planting the seed setts were inoculated by the studied biofertilizer i.e *Azospirillum* and *Azotobacter*, using the recommended dose i.e 24 unit /fed. (unit weight 400g). concerning nitrogen fertilizer the studied doses were applied in two equal doses in the form of Urea (46.5 % N). The 1st one after 60 days from planting and the 2nd dose 30 days later. The recommended dose of potassium and phosphorus (30 kg P_2O_2 and 48 kg k_2O/fed.) was added as followed by farmers.

Inoculation technique: According to plot area (42 m^2) relative to unit area (1 feddan = 4200 m^2), the biofertilizers (Azotobacter and Azosprillum) were weighted, mixed with soil of the experimental field and dressed on cane cuttings allocated in the furrows, and were covered by soil from next ridges. Irrigation took place immediately. The normal agricultural practicas needed for growing sugar cane plants were followed.

The following characters were estimated at harvest in the stems of sugar cane :

*- Total nitrogen % was determined according to Kjeldahl method as reported in AOAC (1975).

*- Potassium (K) and sodium (Na) percentages were determined using flame photometer according to the method discribed by Brown and Lilliand (1964).

The next measurements were determined in the sugar cane juice.

*- brix % was measured using brix hydrometer standard .

*- Sucrose % was determined using Sacharameter according to AOAC (1995).

*- Purity % was calculated according to the following equation :

Purity % = (Sucrose % / Brix %) x 100

*- Sugar Recovery % was calculated as follows:

Sugar Recovery % = Richness % x Purity %

Wher Richness = (Sucrose in 100 g. x Factor)/100

Factor= 100- (Fiber % +physical impurities % + Percent water free sugar).

*- Reducing sugar % was determined in the extracted juice of cane according to chemical control of the Egyptian Production Factories(Anonymuos, 1981).

Satistical analysis :

The collected data were subjected to the proper statistical analysis of complete randomized block design according to snedecor and Chocran (1981). A combined analysis of the two season data was carried out according to Le Clerg *et al.* (1962).

RESULTS AND DISCUSSION

1. Nirogen percentage (N%):

The results obtained in Table (1) showed that sugar cane varieties had no significant effect on nitrogen percentage in sugar cane stalk at harvest. On the contrary, Ahmed (1998) found that there was a significant difference for the used varieties on nitrogen content in the stalks of sugar cane plants in both seasons.

The results obtained in Table (1) recorded that there was general tendency toward increase in N% of sugar cane stalk with increasing the applied dose of mineral nitrogen. However, this increment was insignificant. It is also clear that application of biofertilizer sources i.e., *Azotobacter* and/or *Azospirillum* alone improved nitrogen absorption. This result may threw some light on the important role of these bacteria in increasing the availability of nitrogen in the soil which may be fixed. This result is in line with Thakur and Singh (1996) who noticed that biofertilizers had an important role in the utilization of N by sugar cane through biological N fixation and increasing the availability and uptake of nitrogen.

The interaction effect between fertilizer treatments and varieties had a significant effect on nitrogen percentage at harvest in the second season. The highest value of nitrogen in sugar cane stalk (3.2 5%) was obtained when G.T.54-9 variety was ferti-

lized with 180 kg N/fed.

2. Sodium percentage (Na%):

It is well known that increasing the values of sodium (Na+) and potassium (K+) cations in the extracted juice negatively affect the extracted sugar where it is well proved that each molecule of Na+ and/or K+ in the syrup of cane prevent two moleculs of sucrose to be crystallized during sugar extraction process.

Results given in Table (1) showed that neither sugar cane varieties nor fertilization treatments exhibited any significant affected on sodium percentage of sugar cane stalk. . On the contrary, El-Sayed (1996) noticed that the increase in N level did not significantly influence Na content in stem at harvest in both seasons. Moreover, Ahmed (1998) found that sugar cane varieties had significant effects on Na % in two plant crops and first ratoon crop in the cane stem at harvest.

Concerning the interaction effect between fertilizer treatments and sugar cane varieties on sodium percentage, the results showed that the lowest values of sodium percentage in sugar cane stalk were recorded when the seed setts of sugar cane were inoculated by any of *Azotobactor* with sugar cane variety G. 85-37 or in *Asopirillum* in addition 60 kg N/fed for sugar cane variety G. T. 54-9.. However, the differences between the various combination were insignificant.

3. Potassium percentage (K%):

The collected data in Table (1) revealed that potassium percentage in sugar cane stalk was significantly affected by the examined varieties. Sugar cane variety G.T.54-9 attained lower values than G.85-37 in respect to potassium percentage (0.307 % and 0.387 %). This result is in accordance with Ahmed (1998) who mentioned that varieties had significant effects on K% in sugar cane stalk at harvest.

The available data in Table (1) cleared that fertilization treatments had no significant effect on potassium percentage in stem at harvest in the two growing seasons. This result is in harmony with El-Sayed (1996) who noticed that increasing N level did not significantly influence K content in sugar cane stem at harvest.

It is also clear that inoculated sugar cane seed setts by *Azospirillum* in addition to 120 kg N/fed attained the lowest value of K%, consequently produced better quality than the other treatments.

In general, it could concluded that using biofertilizer source in terms of *Asospirillum* + 120 kg N/fed saved at least 30% from the mineral fertlizer and improved juice quality through lowering the values of K in sugar cane juice consequently increasing the extracted sugar.

The interaction effect between fertilizer treatments with varieties had insignificant effect on potassium percentage in sugar cane stalk at harvest. However, the lowest values of K% were attainable when seed setts for G.T.54-9 variety inoculated by *Azospirillum* + 120 kg N/fed.

4. Brix percentage (B%):

The results in Table (1) showed that in spite of the insignificant effect of varieties on this trait, it could noticed that sugar cane variety G.85-37 recorded higher values (21.69) compared with the commercial variety which recorded (21.40). This result is in agreement with Kanwar *et al.* (1988) who found that varieties did not show any effect on quality parameters.

Data in Table (1) showed that non of mineral nitrogen and/or biofertilizers had a significant effect on Brix % at harvest. Also, the interaction effect of fertilizer treatments with varieties had no significant effect on brix percentage. This result is in agreement with Thakur and Singh (1996) who found that cane juice quality was not significantly affected with biofertilizers.

5. Reducing sugar percentage (R.S.%)

It is well known that there is an opposite relationship between the reducing sugar percentage values and juice quality in respect to extraction. As the values of R.S% increase the amount of the extracted sugar decrease. Based upon the above mentioned fact, it could be noticed that in Table (2) the differences between the studied varieties in respect to R.S.% values are not significant and also negligible. This result is in agreement with El- Geddawy *et al.* (1997) who reported the differences that the used varie-

ties did not reach the level of significant in relation to reducing sugar percentage .

Regarding the effect of mineral nitrogen and biofertilizers (*Azotobacter and Azosirillum*) on R.S.%, the results presented in Table (2) showed that there was no significant effect on reducing sugar percentage due to fertilizer treatments in the two seasons. It is clearly shown from the available data that the lowest values of reducing sugar percentage were attained when sugar cane seed setts were inoculated by *Azosirillum only.* this result assured that there is a positive relationship between the applied dose of nitrogen and reducing sugar percentage.

Concerning the interaction effect between fertilizer treatments and varieties on reducing sugar percentage, the results given showed that this trait was insignificantly affected by the various interactions between the studied factors.

The lowest values of reducing sugar percentage were attainable when sugar cane seed setts of G.T.54-9 variety were inoculated by *Azospirillum* only without any additional amount of nitrogen. This result is in agreement with Thakur and Singh (1996) who found that cane juice quality was not significantly affected by biofertilizers.

6. Fiber percentage:

It is well known that there is an opposite relationship between the extracted sugar and the values of fiber percentage of sugar cane varieties .The lower, the values of fiber percentage, the higher, the extracted sugar .Based on the above mentioned fact , in Table (2) showed that sugar cane variety G.T.54-9 attained a relative advantage in respect to fiber percentage, where the lowest value of fiber percentage was recorded for G.T.54-9 variety. This result is in agreement with El-Geddawy *et al.* (1997) who noticed that fiber percentage was significantly affected by varieties.

Data available in Table (2) proved that fertilization treatments had a significant effect on fiber percentage. It is obviously shown that fiber percentage was significantly decreased with increasing nitrogen fertilizer. The appropriate values of fiber percentage were obtained with inoculated sugar cane seed setts by *Azotobacter* and/or *Azospirillum* in addition to 120 kg N/fed. in the 1st and 2nd season respectively.

Regarding the interaction effect between fertilizer treatments and sugar cane varieties in respect to their effect on fiber percentage. The results showed that fiber percentage statistically affected by the various combination between fertilization treatments and sugar cane varieties. Inoculating the seed setts of cane variety G.T.54-9 by *Azospirillum* in addition to 120 kg N/fed. recorded the lowest value of fiber percentage 12.001 % in the 1st and 2nd season, successively.

In general, it could be cleared that decreasing the additional dose of mineral nitrogen to sugar cane plants increased the values of fiber percentage

7. Sucrose percentage:

Results obtained in Table (2) showed that sucrose percentage at harvest insignificantly affected by the studied varieties. The promising sugar cane variety G.85-37 gave higher percent of sucrose (18.46 %) than G.T.54-9 variety .This result is in line with El-Sayed (1996), who showed that sucrose % of F.153and G.74-96 varieties were not significant.

The collected data in Table (2) showed that mineral and biofertilizers had no significant effect on sucrose percentage in the two seasons. Regardless the insignificant effect of the studied treatments of fertilizer on sucrose percentage, the obtained data showeded a slightly increase in this trait where the highest value of sucrose percentage (18.70 % and 18.76 %) was obtained when sugar cane seed setts were inoculated by *Azotobacter* in addition to 60 kg N/fed. or inoculated by *Azospirillum* in addition 120 kg N/fed. Respectively . As to the interaction effect between fertilizer treatments and varieties on sucrose percentage, the results obtained cleared that the differences between the various combination of the studied factors did not reach the level of significant in both seasons. However, it is shown that inoculated sugar cane seed setts by the studied biofertilizer attained a relative advantage in respect to sucrose % in both seasons.I noculated sugar cane seed setts of G.85-37 variety by *Azotobacter* + 60 kg N/fed. and/or by addition of 180 kg N/fed recorded the highest values of sucrose % i.e.19.65% and 18.56% in the 1st and 2nd season, respectively. This result is in accordance with Settha-Siripin (1986) who added that there were no differnces among the nitrogen treatments inoculated with all bacteria.

8. Purity percentage:

The recorded results in Table (2) showed that the examined varieties had a significant effect on purity percentage at harvest, the highest value of purity percentage (86.08 %) was obtained by G.T. 54-9 compared with G.85-37 which attained 85.04 %. This result is in agreement with EL-Sayed (1996) who found that sugar cane variety F.153 was superior in purity percentage over G.85-37 and G.74-96 varieties.

The available data in Table (2) pointed out that fertilization treatments had no significant influence on purity percentage at harvest.

Once more, the interaction effect between the studied factors on purity percentage had a significant effect on purity percentage at harvest in the first season only. Inoculated sugar cane seed setts of G.T.54-9 variety by *Azospirillum* in addition to the lowest level of nitrogen i.e. 60 kg N/fed attained the highest value of purity percentage (86.89%). This result is in agreement with Bangar *et al.* (1994) who mentioned that sugar cane cv. Co.7318 was given 0-300 kg N/ha. and 0-6 ton press mud cake/ ha. or 4 ton. press mud cake + inoculation with *Azotobacter at* 30 and 60 days after planting. They added that cane quality (purity %) decreased with increasing nitrogen by increasing press mud cake rate .

9. Sugar recovery percentage (S. R.%):

Data given in Table (3) showed that sugar recovery percentage (S. R. %) was affected statistically by the examined varieties, sugar cane variety G.T.54-9 recorded the highest value of S. R. % (12.214 %). On the contrary, Ahmed (1998) found that G.87-55 variety had the highest sugar recovery percentage than G.T.54-9 and F.153 varieties.

The available data in Table (3) cleared that the highest value (12.133%) was recorded by applying 180 kg N/fed. Similar result was obtained when sugar cane seed setts were inoculated by *Azotobactor + 60 kg.N/fed.*. This result is in agreement with Muthukumarasamy *et al.* (1994) , who showed that cane growing rhizophere soil for first time in India, using bacteria as a biofertilizers for sugar cane with a 50% reduction in N fertilizer, showed that there was a marginal increase in sugar recovery.

The interaction effects between varieties and fertilization treatments on sugar recovery percentage had a significant effect at harvest in the first season, the highest value of sugar recovery % (12.687 %) was recorded with applying 180 kg N/fed. alone with G. T. 54-9. variety.

Table 1. Effect of mineral nitrogen and bio-fertilizers on nitrogen, sodium, potassium and brix percentages in stalk of sugarcane at harvest.

Varieties / Fertilization	Nitrogen percentage N %			sodium percentageNa %			potassium percentage K %			Brix percentage B %		
	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
180 kg N/fed	3.25	2.15	2.70	0.170	0.179	0.174	0.325	0.406	0.340	21.45	21.94	21.69
120 kg N/fed	1.80	1.95	1.88	0.198	0.200	0.199	0.291	0.400	0.334	21.89	21.46	21.67
60 kg N/fed	1.75	1.50	1.63	0.282	0.195	0.198	0.270	0.399	0.334	20.86	21.07	20.96
Azotobacter + 60 kg N/fed	1.70	1.55	1.63	0.219	0.161	0.190	0.363	0.380	0.371	21.45	22.05	21.75
Azotobacter + 120 kg N/fed	1.55	1.85	1.70	0.216	0.237	0.204	0.290	0.415	0.352	20.91	21.48	21.20
Azospirillum + 60 kg N/fed	1.95	1.70	1.83	0.163	0.242	0.202	0.282	0.465	0.374	20.98	21.23	21.01
Azospirillum +120 kg N/fed	1.80	1.75	1.78	0.212	0.185	0.199	0.254	0.347	0.301	21.99	21.96	21.97
Azotobacter alone	2.70	1.65	2.18	0.214	0.182	0.198	0.364	0.345	0.354	21.66	22.11	21.88
Azospirillum alone	1.50	2.25	2.08	0.194	0.176	0.185	0.345	0.375	0.360	21.40	21.93	21.66
Average	2.00	1.86	1.93	0.199	0.190	0.194	0.307	0.387	0.347	21.40	21.69	21.54
L.S.D at 5% level												
Varieties (V)			NS			NS			0.042			NS
Fertilization			NS			NS			NS			NS
V x F			0.162			NS			NS			NS

V1: G.T.54-9

V2:G.85-37

Table 2. Effect of mineral nitrogen and bio-fertilizers on reducing sugars, fiber, sucrose and purity percentages in stalk of sugarcane at harvest.

Varieties / Fertilization	Reducing sugars %			Fiber %			Sucrose %			Purity %		
	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
180 kg N/fed	0.443	0.412	0.428	12.042	12.772	12.407	18.63	18.83	18.72	86.80	85.80	86.30
120 kg N/fed	0.396	0.383	0.390	12.385	13.102	12.743	18.72	18.03	146.00	85.66	84.83	85.25
60 kg N/fed	0.357	0.340	0.348	12.477	13.275	12.876	17.84	17.62	17.73	85.72	82.93	84.33
Azotobacter + 60 kg N/fed	0.305	0.306	0.305	12.377	12.802	12.590	18.54	18.84	18.70	86.39	86.16	86.27
Azotobacter + 120 kg N/fed	0.353	0.345	0.349	12.272	12.480	12.376	18.30	18.29	18.29	87.44	84.88	86.16
Azospirillum + 60 kg N/fed	0.411	0.386	0.398	12.225	12.832	12.528	18.24	18.19	18.21	86.89	85.92	86.36
Azospirillum +120 kg N/fed	0.318	0.407	0.362	12.001	12.662	12.329	18.74	18.78	18.76	85.29	85.50	85.39
Azotobacter alone	0.380	0.362	0.371	12.382	13.062	12.722	18.30	18.71	18.51	84.53	84.65	84.59
Azospirillum alone	0.253	0.329	0.291	12.432	13.045	12.739	18.10	18.57	18.48	85.97	74.72	85.26
Average	0.357	0.362	0.360	12.288	12.893	12.590	18.41	18.46	18.43	86.08	85.04	85.56
L.S.D at 5% level												
Varieties (V)			NS			0.057			N.S.			N.S.
Fertilization			NS			0.470			N.S.			N.S.
V x F			NS			0.980			N.S.			2.568

V1: G.T.54-9

V2:G.85-37

Table 3. Effect of mineral nitrogen and bio-fertilizers on sugar recovery percentage in stalk of sugarcane at harvest.

Varieties / Fertilization	Sugar recovery percentage		
	G.T. 54/9	G. 85/37	Average
180 kg N/fed	12.687	12.132	12.334
120 kg N/fed	12.352	11.575	11.963
60 kg N/fed	11.916	10.955	11.435
Azotobacter + 60 kg N/fed	12.275	12.191	12.233
Azotobacter + 120 kg N/fed	12.195	11.940	12.067
Azospirillum + 60 kg N/fed	12.200	12.023	12.116
Azospirillum +120 kg N/fed	12.300	12.027	12.164
Azotobacter alone	11.798	11.752	11.775
Azospirillum alone	12.338	11.797	12.072
Average	12.214	11.821	12.017
L.S.D at 5% level			
Varieties (V)		N. S.	
Fertilization		N. S.	
V x F		N. S.	

REFERENCES

1. Ahmed, Z. A. (1998). Evaluation of some sugar cane varieties under nitrogen fertilization levels and seeding rates. Ph. D. Thesis, Fac. Agric., El-Minia Univ. Egypt.

2. Anonymous (1981). Chemical control in Egyptian sugarProduction factories. Jan., PP 232.

3. Arvind, M. and N. Mohan. (1990). Effect of biofertilizers and thier methods of application on nitrogen economy in sugar cane. Indian J. Agron. 35 (1&2): 120-125.

4. Association of Official Agricultural Chemists (A.O.A.C.).(1995). Official methods of analysis, puplished by the A.O.A.C.,Box 540, Washington..

5. Bangar, K. S.; A. Maini and S. R. Sharma. (1994). Eeffect of nitrogen fertilizer and press mud cake on growth, yield and quality of sugar cane. Crop - Research - Hisar. 8 (1): 23-27.(C.F.The Commnweelth Agric., Bureaux Abst., Dialog FileR.N:7727-37-9 UD : 960401)

6. Brown, J. D. and O. Lilliland (1964). Rapid determination of potassium and sodium in plant material and soil extracts byFlame photometry. Proc. Amer. Soc. Hort. Sci., 48: 341-346.

7. El-Geddawy, I. H.; A. S. El-Debaby; A. M. M. Saad and N. B.Azzazy. (1997). Irrigation systems and nitrogen fertilizer in relation to yield and quality of sugar cane varieties. Egypt. J. Agric. Res.,75(4): 1037-1053.

8. El- Sayed, G. S. (1996). Plant population and nitrogen fertilizer and their effect on yield and quality for some sugar cane varieties. M. Sc. Thesis, Fac. Agric., Moshtohor, Zagazig. Univ., Banha branch. Egypt.

9. Gonzalez, G.; I. Gonzalez; N. Moya; D. Sosa and W. Olivera. (1995). Effect of inoculation with Azospirillum and three levels of nitrogen in sugar cane. (*Saccharaum officinarum*).C266-70 in vitro.Pastos-Y-Forrajes. 18 (3): 245-249.(C.F.The Commnweelth Agric., Bureaux Abst., Dialog File R.N:7727-37-9 UD : 961001) .

10. Kanwar,R.S.; Singh, B.S.; Bains,K.K. Sharma and A.I.S Garch (1988): Yield and quality of sugar cane ratoon crop as influenced by varieties , and nitrogen levels. Bharatiya Sugarm 14 (2); 81-83 (C.F. Sugar Cane Abst.,6-18)

11. Le Clerg, E.L.;W.H.Leonard and A.G. Calark (1962): Field Plot Technique. Burgessm Minneapolis 2nd ed.

12. Muthukumarasamy, R.; G. Revathi and A. R. Solayappan.(1994). Biofertilizers a supplement or substitute for chemical nitrogen for sugar cane crop. Cooperative Sugar 25 (7-8) 287-290.

13. Snedecor, G.W. and W.G. Cochran (1981): Statistical MethodsSeventh Ed. Iowa State Univ. Press, Ames, Iowa, USA.

14. Thakur, S. K. and K. D. N. Singh (1996). Effect of biofertilizers on the nitrogen economy of sugar cane in calciorthent. Indian Sugar, 46 (6): 403-409.

15. Settha- Siripin(1986): Effect of associative nitrogen, fixing bacteria on growth of some sugar cane cultivars. Bangkok (Thiland 172 leaves. Thesis M.Sc.in Agriculture).

تأثير التسميد على المكونات الكيماوية وجودة عصير قصب السكر

ابراهيم حنفى الجداوى[1]، محمد على رزق[2]
محمد جابر عبد الفضيل طه[2]، محمود سيد حسن عثمان[1]

١ معهد بحوث المحاصيل السكرية.
٢ كلية الزراعة جامعة الأزهر.

اجريت هذه الدراسة موسمين متتاليين ١٩٩٦/٩٧ و١٩٩٧/٩٨ بمحطة البحوث الزراعية – شندويل (محافظة سوهاج) . وتهدف الدراسة الى بحث تأثير التسميد الحيوى والمعدنى على المحصول ومكوناته لبعض اصناف قصب السكر.

وقد اشتملت هذه التجربة على ١٨ معاملة هى التوافق بين صنفين من قصب السكر (جيزه تيوان ٥٤-٩) وهو الصنف التجارى وكذلك الصنف المبشر جيزه ٨٥-٣٧ و تسع معاملات تسميد (١٨٠ ، ١٢٠ ، ٦٠ كجم ن /فدان، التلقيح بالأزوتو بكتور + ٦٠ كجم ن/فدان ، التلقيح بالأزوتو بكتور + ١٢٠ كجم ن/فدان ، التلقيح بالأيزوسبرلم + ٦٠ كجم ن/فدان ، التلقيح بالأيزوسبرلم + ١٢٠ كجم ن/فدان ، ازوتزبكتور والأيزوسبرلم فقط.) وتتلخص اهم النتائج فيما يلى:

– لم تتأثر النسبة المئوية لكل من النيتروجين ، الصديوم ، البركس والسكروز و نسبة السكريات المختزله بينما تأثرت معنويا كل من نسبة البوتاسيوم ، النقاوة وناتج السكر بالأصناف المستخدمه. وقد سجل الصنف التجارى جيزه ٥٤-٩ اقل قيمه لنسبة الألياف بالساق.

– ادى استخدام الأسمدة الحيوية " الأزوتوباكتور والأيزوسبرلم " + ١٢٠ كجم نيتروجين /فدان الى تحسن فى نسبة النيتروجين كما سجلت هذه المعاملة اقل قيمة لنسبة البوتاسوم وقيمة مقبولة لنسبة الألياف. كما ان نسبة ناتج السكر(١٢,٣٣ ٪ و ١٢,٢٣ ٪) قد تحققت بأضافة ١٨٠ كجم نيتروجين/فدان او تلقيح التقاوى بالأزوتوبكتور ، بينما كان تأثير مصادر الأسمدة النيتروجنيه على نسبة للصديوم ، البوتاسيوم ، البركس والسكريات المختزلة والسكروز والنقاوة غير معنويا.