J. Agric. Sci. Mansoura Univ., 32 (1): 59 - 74, 2007

YIELD AND QUALITY OF TWO SUGARCANE VARIETIES AS AFFECTED BY BIO AND INORGANIC NITROGEN FERTILIZATION

Ahmed Z.A. and A.M.A. El-Shafai
Sugar Crops Res. Inst., Agric. Res. Center, Giza, Egypt

ABSTRACT

The present investigation was carried out at Mattana Agricultural Research Station, Qena Governorate during 2003/2004 (plant cane) and 2004/2005 (1^{st} ratoon) to investigate the effect of inorganic-N (120, 180 and 240 kg N/fed represented 50, 75 and 100% of the recommended rate, respectively), bio-N (without, Cerialin and Microbin) and their combinations on yield and quality of two sugarcane varieties (G.T.54-9 and Ph..8013). A split-split plot design with three replications was used in both seasons. Bio-N fertilizers were spread in the main plots; inorganic N levels were distributed in the sub plots, while the sub-sub plots were assigned for the two sugarcane varieties.

The results showed significant differences in all studied traits between sugarcane inoculated with Cerioalin and/or Microbin bio-N fertilizers and that left without bio-N. Meanwhile, except for the number of millable cane/m^2 where, Microbin gave higher of it, no statistical variance between the two bio-N fertilizers was found in stalk height, stalk diameter, sucrose%, sugar recovery%, cane and sugar yields.

Increasing inorganic-N levels from 120 up to 240 kg N/fed resulted in a significant increase stalk height, stalk diameter, millable cane/m^2, cane and sugar yields in the plant cane and 1^{st} ratoon canes. Applying 180 kg N/fed gave the highest sucrose% (in the plant cane), while 240 kg N/fed was required to obtain the highest value of this trait in the 1^{st} ratoon. The highest sugar recovery% was recorded by applying 180 kg N/fed in both cane crops.

Sugarcane variety G.T.54-9 surpassed Ph.8013 significantly in all of the studied traits except for stalk diameter, where Ph.8013 variety had thicker stalks.

Under conditions of the present work, supplying sugarcane G.T.54-9 variety grown as a plant or 1^{st} ratoon with 100% of the recommended N-rate (240 kg N/fed) integrated with Cerialin bio-N at the rate of 4 bags (1.6 kg)/fed resulted in the highest sugar yield/fed.

INTRODUCTION

Nowadays, there is a call for the reduction of the environmental pollution resulted from over application of inorganic nitrogen fertilizers as urea and ammonium nitrate or others. Therefore, research has been done to investigate the possibility and efficiency of using bio-N fertilizers combined with different levels of inorganic-N fertilizer and to find out their single and interaction effect on growth, quality and yield of sugarcane.

In respect to the effect of inoculating sugarcane with bio-N fertilizers, Hernandez, *et al*. (2001) mentioned that microbial activity is related to the growth and yield of plants by the production of bacterial Phytohormones in the roots of grasses. This is especially true with *Azospirillum* that has increased maize yield by 10% and between 42 and 44% for sorghum in France. In Cuba, *Azospirillum* increased yield of sugarcane by 20% and it allowed the substitution of 40 kg of nitrogen fertilizer in Guinea grass. Shankariah and Gururaj (2001) showed that soil application of

Azotobacter/*Azospirillum* at 2.5 kg/ha was instrumental in improving sugarcane growth, yield components and yields of both plant and ratoon cane. Bioagents had no effect on quality parameters. However, higher sugar yields were obtained with soil application of *Azotobacter* followed by *Azospirillum*. Song and Zheng (2003) studied the effect of *Acetobacter diazotrophicus* [*Gluconacetobacter diazotrophicus*] (ABD) on the growth of maize and sugarcane. The treatments comprised inoculation with and/or without ABD under N supply and inoculation without ABD under low N supply. ABD inoculation promoted the growth of maize and sugarcane under 2 rates of N fertilizer. The fresh weight, plant height, shoot width and leaf chlorophyll content of the plants inoculated with ABD were higher than the plants without ABD.

As for the influence of inorganic nitrogen levels on sugarcane, Alam, *et al.* (2001) studied the effects of N (0, 120, 160, and 200 kg/ha) on sugarcane. Tiller and millable cane production increased with N rate. The highest number of millable canes, cane and sugar yields were obtained with 200 kg N. Nitrogen fertilizer increased recoverable sucrose content. Shafshak, *et al.* (2001) supplied G.74-96 and F.153 sugarcane cultivars with 150, 190 and 230 kg N/fed. They found that F.153 produced taller stalks compared with G.74-96 which significantly surpassed F.153 in stalk diameter. Meanwhile, insignificant differences between varieties in sucrose content were detected. Increasing N level from 150 to 190 kg N/fed increased stalk height and stalk diameter significantly. No significant difference was detected in stalk height between 190 and 230 kg N/fed levels. Nitrogen levels had no significant effect on sucrose and reducing sugar content. Mahender, *et al.* (2002) fertilized sugarcane with N rates of 75, 100, 125, and 150 % of the recommended dose (150 kg N/ha). They found that cane yield and yield attributes were highest with the application of 125 and 150% of the recommended N. Ahmed (2003-b) found that the application of 210 kg N/fed produced the highest values of sucrose% and sugar recovery%, while applying 240 kg N/fed gave the highest values of the number of millable cane/m^2, millable cane length, cane and sugar yields/fed. Srinivas, *et al.* (2003) applied nitrogen fertilizer (0, 250, and 375 kg N/ha) on sugarcane. They reported that the increase in N rate resulted in the increase in the number of shoots and millable canes, cane yield, and sugar yield. Azzazy, *et al* (2005) supplied sugarcane with three N levels (180, 210 and 240 kg N/fed). They found that increasing N level up to 240 kg N/fed resulted in a significant increase in stalk height, stalk diameter and cane yield of plant cane but decreased sucrose and sugar recovery percentages. Sugar yield was insignificantly affected by N levels.

Concerning the effect of the integrated application of bio and inorganic N on sugarcane, Buragohain (2000) inoculated sugarcane with *Azotobacter chroococcum* or *Azospirillum brasilense* or not inoculated and given 67.5, 101.3 or 135 kg N/ha. Cane yield was significantly higher in the inoculated crops than uninoculated crops with 67.5 or 101.3 kg N. Soil inoculation did not affect commercial cane sugar content. Nagaraju, *et al*. (2000) studied the effect of integrated use of N (0, 50, 75, and 100% of recommended N rates) with or without Azotobacter (5 kg/ha). They found that the integrated use of Azotobacter at 5 kg/ha with 100% N fertilization increased cane and sugar yields. Balasubramanian, *et al.* (2002) added bio-fertilizers (*Azospirillum brasiliense* and *Acetobacter diazotroPh.icus* at 10 kg/ha), and N at 25, 50, 75 and 100% of the recommended rate to sugarcane cv. CoG 93076. They stated that *Acetobacter diazotroPh.icus* + N at 75% of the recommended rate (206.3 kg N/ha) resulted in high cane yield, equivalent to that obtained with *Acetobacter diazotroPh.icus* + N at 100% of the recommended rate (275 kg N/ha). Shankariah, *et al.* (2002) noticed an increased absorption and uptake of N by sugarcane as evident from its higher tissue content besides, higher availability with parallel reduction in NO3 leaching, which were reflected in better N use efficiency as a result of colonizing sugarcane rhizosphere with *Azotobacter chroococcum* (a free living N fixing bioagent).

Regarding varietal differences, El-Geddawy, *et al.* (2002) found that sugarcane cv. G.T.54-9 surpassed F.153 significantly in stalk height and diameter. Mohamed and Ahmed (2002) obtained significant differences among G.T.54-9, F.160 and G.84-47 sugarcane varieties in stalk height, diameter, cane and sugar yields. Ahmed (2003-a) revealed that the promising sugarcane varieties G.95-19, G.95-21 and Ph.8013 differed markedly in millable cane height, diameter, sucrose %, sugar recovery % and sugar yield. He mentioned that the differences among varieties could be due to the relative importance of gene make-up. Ahmed (2003-b) found that G.98-28 and G.98-132 varieties varied significantly in the number of millable cane/m^2, Stalk length, sucrose%, sugar recovery% and cane yield. Azzazy, *et al*. (2005) found that G.T.54-9, Ph.8013, G.95-21, G.99-165, G.98-28 and G.95-19 sugarcane varieties differed significantly in their stalk height and diameter, sucrose % and sugar recovery % as well as cane and sugar yields.

The objective of this work was to study the integrated nutrition of sugarcane with bio and inorganic nitrogen fertilizers through the application of different proportions of the recommended inorganic N-dose with bio-N sources to find out the best combination of them aiming at maximizing yield and quality of sugarcane.

MATERIALS AND METHODS

The present work was carried out at Mattana Agricultural Research Station, Qena Governorate during 2003/2004 and 2004/2005 growing seasons. This work included eighteen treatments represent the combinations between inorganic-N (120, 180 and 240 kg N/fed represent 50, 75 and 100% of the recommended N fertilizer dose), bio-N (without, Cerialin and Microbin) and two sugarcane varieties (the two commercial varieties, viz. G.T.54-9 and Ph.8013). Inorganic N fertilizer was added in the form of Urea (46.5 % N) in two equal doses. In the plant cane, the 1st N dose was applied after two months from planting, preceded with hoeing. In the 1st ratoon, the 1st N-dose was added after one month from harvesting the plant cane, after furrowing (ditching between rows of sugarcane) and earthing-up. The second N dose was added one month after the 1st one, for both plant and 1st ratoon cane crops. Each of Cerialin and Microbin was used at the rate of 4 bags/fed (one bag = 400 g) which contains 10^7-10^9 microbes, approximately. Cerialin comprises an effective strain of *Azospirillum* N-fixing bacteria, while Microbin contains a mixture of N-fixers bacteria viz. *Azospirillum*, *Azotobacter*, *Bacillus* and *Rhizobium*, in addition to phosphate dissolvers. Bio-N fertilizers were mixed with sand and manually thrown on cane cuttings in furrows at planting the virgin cane and irrigation was immediately practiced. In the 1st ratoon, the two bio-fertilizers were applied with the 1st dose of inorganic N fertilizer. The two bio-N sources were brought from the General Organization for Agricultural Equalization Fund (GOAEF), Agricultural Research Center, Giza. A split-split plot design with three replications was used in both seasons. Bio-N fertilizers were spread in the main plots; inorganic N levels were distributed in the sub plots, while the sub-sub plots were assigned for the two sugarcane varieties. Plot area was 42 m^2 (including 7 rows of 1 m apart and 6 m in length). Plant cane was planted in the 3rd week of March using two rows of three-budded cane cuttings. Both plant and 1st ratoon crops were harvested at age of twelve months. Soil chemical and mechanical analysis of the experimental site showed that the upper 30-cm of the soil was clay loam which consisted of 29.4% sand, 10.4% silt and 59.6% clay and contained 34.0, 11.7 and 210 ppm N, P, K, respectively, with P^H of 7.4. Recommended P and K fertilizers were added during seed bed preparation at rates of 30 kg P_2O_5 (as calcium super Phosphate 15.5%) and 72 kg K_2O (as potassium sulphate 48%)/fed, respectively. The other agricultural operations were practiced as recommended by Sugar Crops Research Institute.

Recorded data:

The following data were recorded at harvest:

1. Cane stalk height (cm), which was measured from land level up to the top visible dewlap.
2. Cane stalk diameter (cm), which was measured at the middle part of stalks.
3. Number of millable cane/m^2 was count.

Samples of 20 millable cane stalks from each treatment were collected immediately after harvest, cleaned and crushed to determine sucrose and sugar recovery percentages of cane juice as follows:

4. Sucrose percentage, which was determined using "Saccharemeter" according to A.O.A.C. (1995).
5. Sugar recovery percentage as described by Yadave and Sharma (1980).
6. Cane yield (ton/fed).
7. Sugar yield (ton/fed), which was estimated as follows:
   Sugar yield (ton/fed) = cane yield (tons/fed) x sugar recovery%.

The collected data were statistically analyzed according to Snedecor and Cochran (1981). Treatment means were compared using LSD at 5% level of difference as outlined by Steel and Torrie (1980).

RESULTS AND DISCUSSION

1. Stalk height:

Data in Table 1 show that fertilizing sugarcane with Cerialin and/or Microbin resulted in higher cane stalks compared with that left without any bio-fertilizer. This effect was significant in the plant and its 1st ratoon cane crops. Sugarcane fertilized with Microbin recorded higher values of stalk height compared with that supplied with Cerialin. However, the difference between the two bio-fertilizers was insignificant in both seasons. The positive effect of the bio-N fertilizers could be due to the production of bacterial Phytohormones resulted from microbial activity in root zone which may enhance growth of cane plants as explained by Hernandez, *et al*. (2001). Likewise, Shankariah and Gururaj (2001) showed that soil application of *Azotobacter*/*Azospirillum* was instrumental in improving sugarcane growth, yield components and yield of both plant and ratoon cane. These results are also in line with those found by Song and Zheng (2003).

Results clear that increasing the applied N levels from 120 to 180 and 240 kg N/fed led to a significant increase in stalk height of the plant and 1st ratoon crops (Table 1). Meantime, there was no significant difference in stalk height of sugarcane received 120 and 180 kg N/fed. The increase in stalk height may be attributed to the role of nitrogen as an essential element in building-up plant organs and enhancing their growth. These results are in agreement with those reported by Shafshak, *et al*. (2001); Ahmed (2003-b) and Azzazy, *et al*. (2005).

The two sugarcane varieties differed significantly in stalk height in both cane crops (Table 1). Sugarcane G.T.54-9 variety had higher stalks than Ph.8013. The difference between the tested cv. in this trait may be due to their gene make-up. This result is in agreement with that found by El-Geddawy, *et al.* (2002).

Stalk height was insignificantly influenced by the interactions between the studied factors except for that between the bio-N fertilizers and the two cane varieties, in both cane crops (Table 1). No significant variance between the two varieties in stalk height was observed when they were un-fertilized with the bio-N sources. However, the differences between the two varieties were significant when they were inoculated with any of the two bio-N sources.

2. Stalk diameter:

Data in Table 2 show that cane stalk diameter was significantly affected by the used bio-N fertilizers in the 1st season. This result may be due to an enhancing role of the applied bio-agents colonizing sugarcane rhizosphere through the production of bacterial phytohormones (Hernandez, *et al*., 2001). These results are also in agreement with those reported by Song and Zheng (2003). However, it can be noticed that the difference between Cerialin and Nitrobin as well as the differences between Cerialin and the control (without bio-N) in their effect on this trait were insignificant.

Stalk diameter increased significantly when N level was raised from 120 up to 240 kg N/fed in plant and 1st ratoon cane crops (Table 2). This result may be attributed to the role of N element in building-up plant organs and enhancing plant growth. Those results are in agreement with those reported by Shafshak, *et al.* (2001).

Table 1: Stalk height of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane			1st ratoon		
		G.T. 54-9	Ph. 8013	Mean	G.T. 54-9	Ph. 8013	Mean
Without	120	215.0	207.0	211.0	214.0	209.0	**211.5**
	180	225.0	215.0	220.0	226.0	216.0	**221.0**
	240	250.0	236.0	243.0	256.0	235.0	**245.5**
Mean		**230.0**	**219.3**	**224.6**	**232.0**	**220.0**	**226.0**
Cerialin	120	250.0	235.0	242.5	278.0	235.0	**256.5**
	180	273.0	241.0	257.0	274.0	241.0	**257.5**
	240	304.0	256.0	280.0	304.0	260.0	**282.0**
Mean		**275.6**	**244.0**	**259.8**	**285.3**	**245.3**	**265.3**
Microbin	120	288.0	255.0	271.5	290.0	255.0	**272.5**
	180	297.0	249.0	273.0	295.0	252.0	**273.5**
	240	304.0	256.0	280.0	309.0	262.0	**285.5**
Mean		**296.3**	**253.3**	**274.8**	**298.0**	**256.3**	**277.1**
Varieties x inorganic-N	120	251.0	232.0	241.5	261.0	233.0	**247.0**
	180	265.0	235.0	250.0	265.0	236.0	**250.5**
	240	286.0	249.0	267.5	290.0	252.0	**271.0**
Mean		**267.3**	**238.6**		**272.0**	**240.3**	

LSD at 5 % level for:

	Plant cane	1st ratoon
Bio-N (A)	26.0	32.0
Inorganic-N (B)	16.0	20.0
Cane varieties (C)	*	*
(A) x (B)	NS	NS
(A) x (C)	12.0	19.0
(B) x (C)	NS	NS
(A) x (B) x (C)	NS	NS

Table 2: Stalk diameter of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane			1st ratoon		
		G.T.54-9	Ph. 8013	Mean	G.T.54-9	Ph. 8013	Mean
Without	120	2.55	2.69	**2.62**	2.49	2.70	**2.60**
	180	2.73	2.91	**2.82**	2.85	2.95	**2.90**
	240	2.83	2.99	**2.91**	2.87	2.99	**2.93**
Mean		**2.70**	**2.86**	**2.78**	**2.74**	**2.88**	**2.81**
Cerialin	120	2.75	2.96	**2.86**	2.74	2.98	**2.86**
	180	2.72	2.95	**2.83**	2.80	2.91	**2.85**
	240	2.90	3.00	**2.95**	3.21	3.02	**3.12**
Mean		**2.79**	**2.97**	**2.88**	**2.92**	**2.97**	**2.94**
Microbin	120	2.76	2.85	**2.80**	2.76	2.86	**2.81**
	180	2.88	3.01	**2.95**	2.89	3.00	**2.94**
	240	2.82	3.24	**3.02**	2.82	3.09	**2.96**
Mean		**2.82**	**3.03**	**2.93**	**2.82**	**2.98**	**2.90**
Varieties x inorganic-N	120	2.69	2.83	**2.76**	2.66	2.85	**2.76**
	180	2.78	2.96	**2.87**	2.85	2.95	**2.90**
	240	2.85	3.08	**2.97**	2.97	3.03	**3.00**
Mean		**2.77**	**2.96**		**2.83**	**2.94**	

LSD at 5 % level for:

	Plant cane	1st ratoon
Bio-N (A)	0.12	N.S
Inorganic-N (B)	0.07	0.13
Cane varieties (C)	*	*
(A) x (B)	NS	NS
(A) x (C)	NS	NS
(B) x (C)	NS	NS
(A) x (B) x (C)	NS	NS

Sugarcane Ph.8013 variety had thicker stalks than G.T.54-9 (Table 2). The difference between the two varieties in this trait was significant in both seasons which could be due to their genetic structure. Those results are in agreement with those found by El-Geddawy, *et al.* (2002) and Ahmed (2003-a).

Stalk diameter was insignificantly affected by the interactions between the studied factors in plant and ratoon cane crops (Table 2).

3. Number of millable cane/m^2:

Data in Table 3 reveal that the number of millable cane/ m^2 was significantly affected by the used bio-N fertilizers in the plant and 1st ratoon cane crops. This result might be due to increasing absorption of N by sugarcane and decreasing NO3 leaching, which maybe reflected in better N use efficiency as a result of colonizing sugarcane rhizosphere with N fixing bioagent as shown by Shankariah, *et al*. (2002), and hence the number of millable cane was increased. The results showed that fertilizing sugarcane with Cerialin and Microbin increased the number of millable cane/m^2 by 1.70 and 3.03 in the plant cane, and 1.40 and 2.83 in the 1st ratoon, respectively, compared with that recorded in sugarcane without bio-N fertilization. This result showed that Microbin was much more effective than Cerialin in increasing the number of millable cane/m^2. This result might be due to that Microbin contains a mixture of N-fixers bacteria in addition to Phosphate dissolvers, which make more effective in supplying sugarcane with its needs of N and P elements compared with Cerialin which contains only one fixing-N bacteria.

Significant increases of 0.76 and 1.65 millable canes/m^2 were obtained by supplying sugarcane grown as a plant cane with 180 and 240 kg N/fed, respectively, compared with that recorded by applying 120 kg N/fed, corresponding to insignificant increase of 0.85 and a significant increase of 1.86 millable canes/m^2 in the 1st ratoon (Table 3). These results coincide with those mentioned by Alam, *et al.* (2001) and Srinivas, *et al* (2003).

Sugarcane G.T.54-9 cv. showed a significant superiority and higher tillering ability, where it produced 2.42 and 2.73 millable stalks/m^2 over that given by Ph.8013 cv. in the plant and its 1st ratoon, respectively (Table 3). Differences among cane varieties in this trait were also found by Ahmed (2003-b).

Number of millable cane/m^2 was significantly affected by the interactions between bio-N sources and cane cvs. in the plant cane. The results showed that G.T.54-9 was superior to Ph.8013 in this trait and produced more 1.48, 1.89 and 3.88 millable canes/m^2 under the control, Cerialin and Microbin, respectively, i.e. the difference between the two cvs. in this trait was much distinguished under Microbin than the control. In the 1st ratoon, the number of millable cane/m^2 was significantly affected by the interaction between bio and inorganic N fertilizers. Insignificant difference in this trait was detected when sugarcane was fertilized with 120 and 180 kg N/fed and inoculated with Cerialine or Microbin. However, the difference between 120 and 180 kg N/fed was significant when sugarcane was not biologically fertilized.

Table 3: Number of millable cane/m^2 of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane			1st ratoon		
		G.T. 54-9	Ph. 8013	Mean	G.T. 54-9	Ph. 8013	Mean
Without	120	7.37	7.07	7.22	8.10	6.60	**7.35**
	180	8.73	7.87	8.30	9.27	8.53	**8.90**
	240	10.83	7.57	9.20	11.30	8.60	**9.95**
Mean		**8.98**	**7.50**	**8.24**	**9.56**	**7.91**	**8.73**
Cerialin	120	10.80	8.50	9.65	11.07	8.20	**9.63**
	180	10.53	9.00	9.77	11.40	8.90	**9.95**
	240	11.33	9.50	10.42	12.43	9.20	**10.82**
Mean		**10.89**	**9.00**	**9.94**	**11.63**	**8.63**	**10.13**
Microbin	120	11.87	8.53	10.20	12.16	9.27	**10.72**
	180	13.07	9.47	11.27	13.07	9.73	**11.40**
	240	14.70	10.00	12.35	14.67	10.33	**12.50**
Mean		**13.21**	**9.33**	**11.27**	**13.30**	**9.78**	**11.54**
Varieties x inorganic-N	120	10.01	8.83	**9.02**	10.44	8.02	**9.23**
	180	10.78	8.78	**9.78**	11.24	8.92	**10.08**
	240	12.29	9.02	**10.67**	12.80	9.38	**11.09**
Mean		**11.03**	**8.61**		**11.50**	**8.77**	

LSD at 5 % level for:

	Plant cane	1st ratoon
Bio-N (A)	0.61	0.57
Inorganic-N (B)	0.72	1.01
Cane varieties (C)	*	*
(A) x (B)	NS	NS
(A) x (C)	1.39	NS
(B) x (C)	NS	1.00
(A) x (B) x (C)	NS	NS

4. Sucrose percentage:

Data in Table 4 point out that sucrose % was significantly affected by the used bio-N fertilizers in the plant and 1st ratoon cane crops. However, it was noticed that the differences between Cerialin and each of Microbin and the check treatment in their effect on sucrose% were insignificant in the 1st ratoon. In both seasons, the highest sucrose % was recorded in sugarcane supplied with Cerialin.

Sucrose% was significantly influenced by the applied N levels in both plant cane and its 1st ratoon. In the plant cane, raising N-dose from 120 up to 180 kg N/fed improved sucrose %, thereafter, it decreased by supplying sugarcane with 240 kg N/fed. However, in the 1st ratoon cane crop, sucrose % increased positively as N level was increased up to 240 kg N/fed This result may be due to higher number of plants per unit area than that of the plant cane (Table 3), where the highest N dose was appropriate and required to feed them and to give the maximum sucrose%. Meantime, no statistical variance in sucrose % was detected between applying 180 and 240 kg N/fed in both cane crops. These results are in line with that shown by Ahmed (2003-b).

Sugarcane G.T.54-9 variety surpassed Ph.8013 in sucrose% significantly in the plant and 1st ratoon cane crops (Table 4). It is known that sucrose% is a genetically controlled trait. Similar results were reported by Ahmed (2003-a) and Azzazy, *et al*. (2005).

Sucrose% was significantly affected by the interactions between the studied factors in both cane crops (Table 4). Regarding the interaction between bio and inorganic N fertilizers, the highest sucrose% was recorded by applying 240 kg N/fed without applying any biological N source, while applying 180 kg N/fed was enough in case of applying Cerialin or Microbin in both cane crops. As for the interaction between bio-N fertilizers and cane varieties, the superiority of GT54-9 variety over Ph.8013 in sucrose% was clearer in sugarcane inoculated with Cerialine (the difference in sucrose% was 1.12%). However, the difference was only 0.83% under Microbin, in the plant cane. In the 1st ratoon, the difference in sucrose% was 0.96% with the inoculation by Microbin than the difference between them was only 0.64% using Cerialin. Concerning the interaction between inorganic N levels and cane varieties, the difference in sucrose% was insignificant when any of the tested cvs. was fertilized with 180 and 240 kg N/fed, while the differences between any of those two N levels and 120 N/fed were significant, in both cane crops.

Table 4: Sucrose percentage of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane			1st ratoon		
		G.T. 54-9	**Ph. 8013**	**Mean**	**G.T. 54-9**	**Ph. 8013**	**Mean**
Without	120	14.40	13.18	13.79	14.95	14.10	**14.53**
	180	16.19	15.68	15.94	15.98	15.89	**15.94**
	240	17.94	16.62	17.28	17.89	17.03	**17.46**
Mean		**16.18**	**15.16**	**15.67**	**16.28**	**15.67**	**15.98**
Cerialin	120	16.42	15.92	16.17	17.07	16.44	**16.75**
	180	18.88	17.48	18.18	18.65	17.75	**18.20**
	240	18.05	16.58	17.32	17.73	17.34	**17.53**
Mean		**17.78**	**16.66**	**17.22**	**17.82**	**17.18**	**17.50**
Microbin	120	15.45	14.93	15.19	16.49	15.66	**16.07**
	180	17.77	16.59	17.18	17.40	16.27	**16.84**
	240	16.97	16.16	16.57	17.14	16.23	**16.69**
Mean		**16.73**	**15.90**	**16.31**	**17.01**	**16.05**	**16.53**
Varieties x inorganic-N	120	15.43	14.68	**15.05**	16.17	15.40	**15.78**
	180	17.61	16.59	**17.10**	17.34	16.64	**16.99**
	240	17.65	16.46	**17.06**	17.59	16.86	**17.23**
Mean		**16.90**	**15.91**		**16.17**	**15.40**	

LSD at 5 % level for:

	Plant cane	1st ratoon
Bio-N (A)	0.59	1.23
Inorganic-N (B)	0.62	0.83
Cane varieties (C)	*	*
(A) x (B)	1.08	1.44
(A) x (C)	0.33	0.43
(B) x (C)	0.33	0.43
(A) x (B) x (C)	0.80	0.75

In respect to the second order interaction, the two sugarcane varieties gave higher sucrose% when they were fertilized with 240 kg N/fed compared with 120 and/or 180 kg N/fed, without adding any bio-N fertilizers, however, the tested varieties recorded higher values of this trait by applying 180 kg N/fed with Cerialin or Microbin, in both plant and 1st ratoon canes. The highest sucrose% was obtained by inoculating G.T.54-9 sugarcane variety with Cerialin and supplying it with 180 kg N/fed, in both crops.

5. Sugar recovery percentage:

Data in Table 5 reveal that the used bio-N fertilizers had a significant effect on sugar recovery% in the plant and 1st ratoon cane crops. However, no significant difference was detected between Cerialin and Microbin in their effect on this trait in the plant cane. Moreover, insignificant variance was found between the check treatment and Microbion, 1st ratoon. Inoculating sugarcane with Cerialin resulted in the highest sugar recovery% in both seasons.

Sugar recovery% was significantly affected by the applied N levels. In both cane crops, supplying sugarcane with the middle N-dose (180 kg N/fed) attained the highest sugar recovery% without statistical variance with 240 kg N/fed (Table 5). This result is similar to that of sucrose% (Table 4), where it is known that sugar recovery% depends mainly on sucrose content. Similar results were given by Ahmed (2003-b).

Significant difference in sugar recovery% was observed the two sugarcane varieties with a superiority of G.T.54-9 over Ph.8013, in both seasons (Table 5). This result is probably due to higher sucrose% recorded by G.T.54-9 (Table 4). Varietal differences in this trait were also found by Ahmed (2003-a) and Azzazy, *et al*. (2005).

Sugar recovery% was significantly affected by the interactions between the studied factors (Table 5). In respect to the interaction between bio and inorganic N fertilizers, the highest sugar recovery% was recorded by supplying the plant cane with 240 kg N/fed without applying any biological N fertilizer. However, when Cerialin or Microbin was added combined with inorganic N in the plant cane, adding 180 kg N/fed was enough to achieve the highest values of this trait. Regarding the interaction between bio-N fertilizers and cane varieties, the difference in sugar recovery% between G.T.54-9 and Ph.8013 varieties was more distinguished in sugarcane inoculated with Cerialine (0.73%) compared with that inoculated with Microbin (0.67%) or that without bio-N (0.46%), in the plant cane. In the 1st ratoon, insignificant variance in sugar recovery% was detected between the two varieties when they were grown under the check treatment and/or inoculated with Cerialine, however, the difference was significant with Microbin. As for the interaction between inorganic N levels and cane varieties, fertilizing Ph.8013, grown as plant cane, with 180 or 240 did not cause a significant difference in sugar recovery%. Meanwhile, the differences between any of those N doses and 120 kg N/fed were significant. In the 1st ratoon cane, the same observation was noticed for the two varieties.

In respect to the interaction between the three studied factors, both of sugarcane varieties gave higher sugar recovery% when they were unfertilized biologically and supplied with 240 kg N/fed compared with 120 and/or 180 kg

N/fed. However, the two varieties recorded higher values of this trait when they were inoculated with Cerialin or Microbin and fertilized with 180 kg N/fed, in both plant and 1st ratoon canes. Planting G.T.54-9 variety inoculated with Cerialin and supplied with 180 kg N/fed gave the highest sugar recovery%, in both crops.

Table 5: Sugar recovery percentage of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane			1st ratoon		
		G.T. 54-9	Ph. 8013	Mean	G.T. 54-9	Ph. 8013	Mean
Without	120	8.82	7.90	8.36	9.73	9.37	**9.56**
	180	10.13	10.07	10.10	10.36	10.77	**10.57**
	240	11.60	11.17	11.38	11.96	11.45	**11.71**
Mean		**10.18**	**9.72**	**9.95**	**10.68**	**10.54**	**10.61**
Cerialin	120	10.82	10.52	10.67	11.41	11.32	**11.37**
	180	13.02	11.73	12.39	12.67	12.21	**12.44**
	240	11.62	11.00	11.31	11.55	11.84	**11.70**
Mean		**11.82**	**11.09**	**11.45**	**11.88**	**11.79**	**11.83**
Microbin	120	10.98	10.63	10.80	10.49	10.31	**10.40**
	180	12.60	11.12	11.86	11.68	10.93	**11.31**
	240	10.93	10.74	10.84	11.17	10.58	**10.88**
Mean		**11.50**	**10.83**	**11.17**	**11.11**	**10.61**	**10.86**
Varieties x inorganic-N	120	10.20	9.68	9.94	10.54	10.33	**10.44**
	180	11.92	10.98	11.45	11.57	11.30	**11.44**
	240	11.38	10.97	11.18	11.56	11.29	**11.43**
Mean		**11.17**	**10.54**		**11.23**	**10.98**	

LSD at 5 % level for:	Plant cane	1st ratoon
Bio-N (A)	0.90	0.85
Inorganic-N (B)	0.73	0.90
Cane varieties (C)	*	*
(A) x (B)	1.27	NS
(A) x (C)	0.45	0.38
(B) x (C)	0.45	0.38
(A) x (B) x (C)	0.77	NS

6. Cane yield:

Data in Table 6 show that cane yield was significantly affected by the applied bio-N fertilizers in the plant and 1st ratoon canes. Sugarcane inoculated with Cerialin and Microbin produced 2.225 and 2.806 tons/fed higher than the un-inoculated one, respectively, in the plant cane, and 2.247 and 3.732 tons/fed, in the 1st ratoon. These results clear that the effectiveness of the used bio-N sources on cane yield was higher in 1st ratoon than the plant cane crop. In both cane crops, applying Microbin gave the highest cane yield/fed with insignificant variance with that obtained by adding Cerialin. The increase in cane yield as affected by the used bio-N fertilizers could be attributed to the increase in cane stalk height, diameter and number of millable canes/m^2 (Tables 1, 2 and 3, respectively). These results are in agreement with those mentioned by Buragohain (2000) and Shankariah and Gururaj (2001).

Cane yield responded significantly and positively to the applied inorganic-N doses. Increasing N dose to 180 and to 240 kg N/fed increased cane yield of the plant cane by 4.482 and 12.316 tons/fed, compared with that obtained by adding 120 kg N/fed, respectively, corresponding to 5.058 and 12.742 tons/fed in the 1st ratoon cane crop (Table 6). These results are probably due to the increase in cane stalk height, diameter and number of millable canes/m^2 (Table 1, 2 and 3, respectively). These results are in agreement with those reported by Alam, *et al.* (2001), Ahmed (2003-b), Srinivas, *et al.* (2003) and Azzazy, *et al*. (2005).

Sugarcane G.T.54-9 variety exhibited the superiority in cane yield recording significant increases amounted to 1.705 and 2.814 tons/fed higher than those produced by Ph.8013 variety, in the plant and 1st ratoon canes, respectively. These results could be attributed to higher values of stalk height and number of millable canes/m^2 (Table 1 and 3, respectively). These results are in agreement with those reported by El-Geddawy, *et al.* (2002), Mohamed and Ahmed (2002) and Azzazy, *et al*. (2005).

Cane yield was significantly affected by the interactions between the studied factors (Table 6). Regarding the interaction between bio and inorganic N fertilizers, insignificant difference in cane yield was found in case of fertilizing sugarcane with 120 and 180 kg N/fed and inoculating it with Cerialin, however, the differences in cane yield between the two N levels were significant under Microbin and the check treatment, in both plant and 1st ratoon canes. As for the interaction between bio-N fertilizers and cane varieties, the difference in cane yield between G.T.54-9 and Ph.8013 varieties was clearer in sugarcane biologically un-inoculated (2.097 tons/fed) compared with that inoculated with Micronin (1.520 tons/fed) or that inoculated with Cerialin (1.498 tons/fed), in the plant cane. Concerning the interaction between inorganic N levels and cane varieties in the plant cane, sugarcane G.T.54-9 variety out-yielded Ph.8013 by 1.562, 1.772 and 1.779 tons/fed when they received 120, 180 and 240 kg N/fed, respectively. These results may indicate that G.T.54-9 variety was more efficient than Ph.8913 in utilizing the applied N doses and produced higher cane yield/fed. In respect to the second order interaction between the three studied factors, the difference between the two varieties was insignificant when they were inoculated with Microbin and fertilized with 120 kg N/fed, while the differences between cane varieties were significant when they were supplied with 189 or 240 kg N/fed under Cerialin or without bio-N. The greatest cane yield/fed of the plant cane (50.903 tons) was obtained by planting G.T.54-9 variety inoculated with Cerialin and supplied with 240 kg N/fed. In the 1st ratoon crop highest cane yield/fed (52.423 tons) was obtained by planting the same variety inoculated with Microbin without significant difference with that recorded by the same variety and the same inorganic N level with Cerialin (51.300 tons).

Table 6: Cane yield of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane G.T. 54-9	Plant cane Ph. 8013	Plant cane Mean	1st ratoon G.T. 54-9	1st ratoon Ph.. 8013	1st ratoon Mean
Without	120	36.571	34.575	35.573	36.783	33.133	**34.958**
	180	40.390	38.193	39.292	40.733	36.833	**38.783**
	240	48.097	46.000	47.048	49.500	45.683	**47.592**
Mean		**41.686**	**39.589**	**40.630**	**42.339**	**38.550**	**40.444**
Cerialin	120	38.613	37.431	38.022	39.356	37.437	**38.396**
	180	40.305	38.644	39.475	40.433	39.954	**40.194**
	240	50.903	49.253	50.078	51.300	47.667	**49.483**
Mean		**43.274**	**41.776**	**42.525**	**43.696**	**41.686**	**42.691**
Microbin	120	36.959	35.450	36.204	37.117	35.198	**36.157**
	180	45.210	43.751	44.480	46.993	44.467	**45.710**
	240	50.418	48.827	49.623	52.423	48.900	**50.662**
Mean		**44.196**	**42.676**	**43.436**	**45.498**	**42.855**	**44.176**
Varieties x inorganic-N	120	37.381	35.819	36.600	37.752	35.256	**36.504**
	180	41.968	40.196	41.082	42.707	40.418	**41.562**
	240	49.806	48.027	48.916	51.074	47.417	**49.246**
Mean		**43.052**	**41.347**		**43.844**	**41.030**	

LSD at 5 % level for:	Plant cane	1st ratoon
Bio-N (A)	1.066	2.663
Inorganic-N (B)	1.099	1.636
Cane varieties (C)	*	*
(A) x (B)	2.101	2.834
(A) x (C)	0.508	NS
(B) x (C)	0.508	NS
(A) x (B) x (C)	0.880	2.607

7. Sugar yield:

Data in Table 7 show that sugar yield was significantly affected by the used bio-N fertilizers in the plant and 1st ratoon canes. Applying any of the two biological fertilizers led to an increase in sugar yield/fed compared to the untreated. These results are in agreement with those mentioned by Hernandez, *et al.* (2001) and Shankariah and Gururaj (2001). Inoculating sugarcane with Cerialin gave the highest sugar yield/fed in both cane crops. Sugar yield was increased by 0.758 and 0.770 ton/fed, when sugarcane was fertilized with Cerialin, compared with that fertilized with Microbin and the check treatment, in the plant cane, respectively, and 0.481 and 0.709 ton/fed, in the 1st ratoon. These results may be due to higher values of sucrose and sugar recovery percentages in sugarcane fertilized with Cerialin. Meantime, no significant variance between Cerialin and Microbin was detected in their effect on sugar yield, in both cane crops.

Sugar yield was significantly increased by 1.251 and 2.006 tons/fed, in the plant cane, and 0.935 and 1.807 ton/fed in the 1st ratoon, when N level was raised to 180 and 240 kg N/fed compared to 120 kg N/fed (Table 7). These results are in agreement with that reported by Srinivas *et al. (2003)*. This increase in sugar yield as affected by increasing N level is probably due to the gradual increase in cane yield (Table 6), which is considered the main component of sugar yield. It may be also due to the increase in sugar recovery% up to 180 kg N/fed (Table 5), which contributes to the obtained sugar yield from the raw sugar material, i.e. cane yield.

The two sugarcane varieties differed significantly in sugar yield/fed in both plant and 1st ratoon canes. Sugarcane G.T.54-9 variety produced 0.449 and 0.420 ton/fed higher than that obtained from Ph.8013, in the plant and 1st ratoon cane, respectively. This result could be attributed to higher values of cane sugar recovery% recorded by G.T.45-9 variety. Vaietal differences in sugar yield/fed were also found by Mohamed and Ahmerd (2002) and Azzazy, *et al.* (2005).

Sugar yield was significantly affected by the interactions between studied factors. Regarding (A x B), in the plant cane, insignificant difference was found in sugar yield between 180 and 240 kg N/fed with Microbin, while the difference between the two N levels was significant with Cerialin or without bio-N. In the 1st ratoon, the differences in sugar yield between 180 and 240 kg N/fed were insignificant under both bio-N fertilizers and significant under the check treatment. As for (A) x (C), in the plant cane, the difference between the two varieties in sugar yield was higher under Cerialin (0.481 ton/fed), followed by Microbin (0.664 ton/fed) and lower (0.400 ton/fed) without bio-N fertilizers.

Table 7: Sugar yield (ton/fed) of the two sugarcane varieties as affected by inorganic and bio-N of the plant cane and 1st ratoon crops

Bio-N	Inorganic N Kg N/fed	Plant cane			1st ratoon		
		G.T. 54-9	Ph. 8013	Mean	G.T. 54-9	Ph. 8013	Mean
Without	120	3.223	2.699	2.961	3.580	3.106	**3.343**
	180	4.095	3.854	3.975	4.229	3.970	**4.100**
	240	5.577	5.141	5.359	5.917	5.237	**5.577**
Mean		**4.298**	**3.898**	**4.098**	**4.575**	**4.104**	**4.340**
Cerialin	120	4.173	3.933	4.053	4.476	4.237	**4.357**
	180	5.239	4.534	4.887	5.129	4.883	**5.006**
	240	5.915	5.416	5.666	5.925	5.646	**5.785**
Mean		**5.109**	**4.628**	**4.868**	**5.177**	**4.922**	**5.049**
Microbin	120	4.058	3.768	3.913	3.905	3.633	**3.769**
	180	5.692	4.861	5.277	5.489	4.846	**5.168**
	240	5.514	5.244	5.379	5.874	5.180	**5.527**
Mean		**5.088**	**4.624**	**4.856**	**5.089**	**4.553**	**4.821**
Varieties x inorganic-N	120	3.818	3.467	3.462	3.987	3.659	**3.823**
	180	5.009	4.417	4.713	4.949	4.567	**4.758**
	240	5.669	5.267	5.468	5.905	5.354	**5.630**
Mean		**4.832**	**4.383**		**4.947**	**4.527**	

LSD at 5 % level for:	Plant cane	1st ratoon
Bio-N (A)	0.355	0.514
Mineral-N (B)	0.320	0.501
Cane varieties (C)	*	*
(A) x (B)	0.554	0.868
(A) x (C)	0.232	NS
(B) x (C)	0.232	NS
(A) x (B) x (C)	0.402	0.413

Regarding (B) x (C), in the plant cane, the difference between the two varieties in sugar yield was higher under 180 kg N/fed (0.592 ton/fed) followed by 240 kg N/fed (0.402 ton/fed) and lower (0.351 ton/fed) with the application of 120 kg N/fed. Concerning (A) x (B) x (C), in the plant cane, insignificant difference was found between the two cvs. in sugar yield/fed when they were fertilized with 240 kg N/fed + Microbin, while the difference was significant using the same N level under Cerialine and/or without bio N. In the 1st ratoon, insignificant difference was found between the two cvs. in sugar yield/fed when they were fertilized with 120 kg N/fed + Cerialin and/or Microbin, while the difference was significant in case of using the same N level without bio N.

Under conditions of the present work, supplying sugarcane G.T.54-9 variety grown as a plant or 1st ratoon with 100% of the recommended inorganic N dose (240 kg N/fed) integrated with Cerialin bio N at the rate of 4 bags (1.6 kg)/fed resulted in the highest sugar yield/fed. These results are in line with that given by Nagaraju, *et al.* (2000).

REFERENCES

Ahmed A.Z. (2003-a). Harvesting age with relation to yield and quality of some promising sugarcane varieties. Egypt. J. Appl. Sci., 18 (7):114-124.

Ahmed A.Z. (2003-b). Assessment of the optimum nitrogen level and seeding rate for two promising sugarcane varieties. Egypt. J. Appl. Sci., 18 (6-B):559-573.

Alam, F.; C. Saha and M.A.A. Bhuiya (2001). Effects of nitrogen and potassium on sugarcane under both rainfed and irrigated conditions. Bangladesh J. Training and Develop., 14(1/2): 199-204.

A.O.A.C. (1995). Association of Official Analytical Chemists. Official methods of analysis, 16th Ed., A.O.A.C. International, Washington, D.C., USA.

Azzazy, N.B.; A.M.A. El-Shafai and A.M. Abd El-Aal (2005). Performance of some promising plant and ratoon sugarcane varieties under different nitrogen levels. Egypt. J. Agric. Sci., 20(8A):65-78.

Balasubramanian, A.; V. Balasubramanian and S. Kumaran (2002). Effect of biofertilizers and graded doses of inorganic nitrogen on the yield of seed cane. Crop Res. Hisar, 23 (2): 341-343.

Buragohain, S. K. (2000). Efficacy of biofertilizers with varying levels of N on growth, yield and quality of sugarcane (*Saccharum officinarum*, L.). Indian Sugar, 49(10): 847-850.

El-Geddawy, I.H.; D.G. Darweish; A.A. El-Sherbiny and E.E.A. El-Hady (2002). Effect of row spacing and number of buds/seed setts on 1-growth characters of ratoon crops for some sugar cane varieties. Pakistan Sugar J., 17(3): 7-14.

Hernandez, Y.; O.A. Garcia and M. Ramon (2001). The use of soil microorganisms in crops of interest for livestock production. Cuban J. Agric. Sci., 35(2): 81-92.

Mahender S.; S.N.L. Srivastava and S. Chander (2002). Effect of weed control methods and nitrogen levels on yield attributes and yield of sugarcane. Annals Agric. Res. 23(2): 322-324.

Mohamed, B.D. and A.Z. Ahmed (2002). Influence of panting seasons and nitrogen fertilizer levels on productivity of three sugar cane varieties. Egypt. Appl. Sci., 17 (3): 64-77.

Nagaraju, M.S.; C. Shankaraiah and R. Usha (2000). Effect of integrated use of fertilizer nitrogen with sulPh.itation pressmud and Azotobacter on growth, yield and quality of sugarcane. Mysore J. Agric. Sci., 34(4): 311-316.

Shafshak, S.A.; I.H. El-Geddawy; S.A.H. Allam and G.S. El-Sayed (2001). Effect of planting densities and nitrogen fertilizer on: 1. Growth criteria, juice quality and chemical constituents of some sugar cane varieties. Pakistan Sugar J., 16(4): 2-11.

Shankariah, C. and H. Gururaj (2001). Field response of sugarcane to associative N2 fixers and P solubilisers. International Soc. Sugar Cane Technol. Proc. The XXIV Cong., Brisbane, Australia, 17-21 Sept., 2001, 2: 40-46.

Shankariah, C.; M.S. Nagaraju and H. Gururaj (2002). Effect of associative nitrogen fixing bioagents on nitrogen nutrition of sugarcane and environmental quality. Proc. The 64th Ann. Convention Sugar Technol. Assoc. India. Cochin Kerala, India, 17-19 Aug., 2002; A 12-A22.

Snedecor, G.W. and W.G. Cochran (1981). Statistical methods. Seventh Ed. Iowa State Univ.Press, Ames, Iowa, USA.

Song, Y. and W. Zheng (2003). Influence of *Acetobacter diazotroPh.icus* on growth of plant. Acta Agric. Univ. Jiangxiensis, 25(4): 587-590. Biotechnol. Center, Fujian Academy Agric. Sci., Fuzhou 350003, China.

Srinivas D.; B.R.B. Rao; K. Suresh; M.J. Kumar and L.K. Reddy (2003). Influence of levels of nitrogen on the yield and quality of early-maturing sugarcane varieties. Cooperative Sugar, 34(6): 479-482.

Steel, RG.D. and J.H. Torrie (1980). Principles and procedures of statistics. Mc Grow-Hill Book Co. Inc., New York.

Yadave, R.L. and R.K. Sharma (1980). Effect of nitrogen level and harvesting date on quality characteristics and yield of four sugar cane genotypes. Indian J. Agric. Sci., 50: 581-589.

تأثر حاصل وجودة صنفين من قصب السكر بالتسميد النيتروجينى الحيوى وغير العضوى

أحمد زكى أحمد و عبدالله الشافعى
معهد بحوث المحاصيل السكرية – مركز البحوث الزراعية – الجيزة

أجريت هذه الدراسة بمحطة بحوث المطاعنة بمحافظة قنا فى موسمى الزراعة ٢٠٠٤/٢٠٠٣ و ٢٠٠٥/٢٠٠٤ لدراسة تأثير التسميد النيتروجينى غير العضوى (١٢٠ ، ١٨٠ و ٢٤٠ كجم ن/فدان تمثل ٥٠ ، ٧٥ و ١٠٠ % من المعدل الموصى به) والتسميد النيتروجينى الحيوى (بدون ، سريالين وميكروبين) وتوليفاتهما على حاصل وجودة الغرس والخلفة الأولى لصنفين من قصب السكر (جيزة-تايوان ٥٤-٩ و بى اتش ٨٠١٣). استخدم تصميم القطاعات المنشقة مرتين فى ثلاثة مكررات، حيث وضعت معاملات السماد الحيوى فى القطع الرئيسية ووزعت مستويات السماد النيتروجينى غير العضوى عشوائيا فى القطع الشقية الأولى فى حين خصصت القطع الشقية الثانية لصنفى القصب.

أظهرت النتائج فروقا معنوية فى كل الصفات تحت الدراسة بين قصب السكر الملقح بالسريالين و/أو الميكروبين وبين الذى ترك بدون تسميد نيتروجينى حيوى. باستثناء عدد العيدان القابلة للعصير/م^{٢} (حيث أعطى الميكروبين قيمة أعلى لها) فلم يكن هناك فرقا معنويا بين السريالين والميكروبين فى طول وقطر العيدان ، والنسبة المئوية للسكروز وناتج السكر ، وحاصل العيدان والسكر.

أدت زيادة مستوى السماد النيتروجينى غير العضوى من ١٢٠ وحتى ٢٤٠ كجم ن/فدان الى زيادة معنوية فى طول وقطر العيدان وعدد العيدان القابلة للعصير/م^{٢} وحاصل العيدان والسكر/فدان فى القصب الغرس والخلفة الأولى. أعطت اضافة ١٨٠ كجم ن/فدان أعلى نسبة مئوية للسكروز فى القصب الغرس فى حين كانت اضافة ٢٤٠ كجم ن/فدان لازمة للحصول على أعلى قيمة لتلك الصفة فى الخلفة الأولى. أعطت اضافة ١٨٠ كجم ن/فدان أعلى نسبة مئوية لناتج السكر فى كلا المحصولين (الغرس والخلفة الأولي).

تفوق صنف قصب السكر جيزة-تايوان ٥٤-٩ معنويا على الصنف بى اتش ٨٠١٣ فى كل الصفات تحت الدراسة فيما عدا قطر العود حيث كانت عيدان الصنف بى اتش ٨٠١٣ أكثر سمكا.

تحت ظروف هذا البحث فان تسميد صنف قصب السكر جيزة-تايوان ٥٤-٩ باضافة ٢٤٠ كجم ن/فدان كسماد نيتروجينى غير عضوى متكاملا مع السريالين كسماد نيتروجينى حيوى بمعدل أربعة أكياس (١,٦ كجم)/فدان قد أعطى أعلى حاصل سكر/فدان.

59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74

59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74