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OPTIMUM ROW SPACING AND NITROGEN LEVEL FOR THE PLANT CANE AND RATOON OF THE NEW PROMISING SUGARCANE VARIETY F.153

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Abstract

The present work was conducted at Mallawi Research Station, El Minia Governorate to study the effect of row spacing and nitrogen fertilizer on yield and quality of two spring plant cane crops planted in 1995/1996 and 1996/1997 and their ratoons in 1996/1997 and 1997/1998 seasons. The study included twelve treatments which were the combination between three row spacings (80, 100 and 120 cm) and four nitrogen levels (150, 180, and 210 kgN/fed). The new promising sugar cane variety viz F. 153 was used in this investigation. The obtained results showed that stalk diameter, sucrose and purity percentages of the two plant canes or their first ratoons were not significantly affected by the used N levels. However, stalk height responded to N levels. Cane and sugar yields were significantly increased as the applied N levels were raised up to 210 kg N/fed for the two plant cane and/or ratoon crops. Sucrose and total soluble solids percentages of the plant cane in 1995/1996 and its first ratoon were insignificantly affected by row spacing. However, sucrose, total soluble solids and purity percentages significantly responded to row spacings under the first ratoon in 1997/1998. Cane and sugar yields were significantly increased up to 120 cm row spacing for the plant cane and/or ratoon crops.

INTRODUCTION

The sugarcane variety G.T.54-9 occupies most area in Egypt replacing Nco. 310 variety which was attacked by smut. Recently, Sugar Crops Research Institute has selected a group of sugarcane varieties among them F.153 is considered a promising one. The present work was conducted to find out the appropriate levels of nitrogen and row spacing which will give the highest yield and quality for that new cane variety. Mali et al. (1982) showed that application of nitrogen at rate of 150 or 300 kgN/ha increased height and diameter of cane plant. Singh et al. (1982) found that using two row spacings of 60 and 90 cm for sugaracane received three N-rate (37.5, 75 and 150 kg/ha) had no appreciable effect on juice quality. Prasad et al. (1983) stated that spacing of 90 cm gave thicker canes than 70cm. Mali and Singh (1985) revealed that commercial cane sugar production was significantly higher at

90 cm (10.42 ton/ha) and 120 cm (10.44 ton/ha) than at 60 cm (8.72 ton/ha). Ravindra et al. (1989) fertilized sugarcane with nitrogen at rates of 0, 150, 300 or 450 kg N/ha. They found that the quality parameters of brix, sucrose and putity percentages were not affected. Devi et al. (1990) cleared that juice sucrose content and cane yield were unaffected by nitrogen fertilizer levels of 112 and 168 Kg N/ha as well as row spacings of 60 and 80 cm. Jayabal and Chockalingam (1990) grew sugarcane in rows of 40, 60 and 80 cm i.e., bud density of 150000, 200000 and 250000/ha and fertilized with nitrogen levels ranged from 300 to 600 Kg/ha. They showed that increasing N application from 300 to 600 Kg/ha increased cane yield from 112.3 to 124.1 tons/ha. They added that commercial cane sugar percentage was not affected by bud density. Patel et al. (1990) planted sugarcane at inter-row spacing of 60, 75 and 90 cm applied with 250, 312.5 or 250 + 62.5 Kg N (as foliar application). They reported that the used N levels resulted in cane yield of 125. 98, 140 and 125.62 tons/ha (with or without the application of 62.5 Kg N/ha as foliar application), respectively. They added that 75 cm row spacing produced the highest cane yield (143.31tons/ha). Prasad et al. (1991) fertilized sugarcane with 0, 60, 120 or 180 kg N/ha. They pointed out that sugar yield increased with the supplied nitrogen up to 180 kg N/ha in the first season and 120 kg N/ha in the second one. Banger et al. (1992) obtained significant positive correlations between N levels (0. 150, 300 or 450 kg N/ha) and plant height and stem diameter. Abu-Bakr (1997) found that stalk height was insigificantly affected by the used row spacings (100, 120 and 140 cm). He added that row spacings equally affected brix%. El-Shafai (1997) found that there were no apparent differences in stalk diameter due to applying 180 and 240 Kg N/fed.

MATERIALS AND METHODS

The present work was conducted at Mallawi Research Station, El Minia Governorate to study the effect of row spacing and nitrogen fertilizer on yield and quality of two spring plant cane crops planted in 1995/1996 and 1996/1997 and their ratoons grown in 1996/1997 and 1997/1998 seasons. The study included twelve treatments which were the combination of three row spacings (80, 100 and 120 cm) and four nitrogen levels (150, 180, 210 and 240 KgN/fed). The new promising variety viz. F. 153 was used the present work. Nitrogen fertilizer was applied in the form of Urea (46%N). Nitrogen levels were split into two equal doses, the first one was applied after 45 days from planting and the second dose one month later. Planting the plant cane took place during the second week of March in the two growing seasons. A split plot design with four replicates was used. Row spacings were allo-

cated in the main plots and nitrogen levels were randomly distributed in the sub plots.

Data Recorded:

At harvest, a sample of 20 stalks from each treatment was collected from the middle rows and the following date were recorded:

1. Stalk height (cm.) was measured from land level till dewlap.
2. Stalk diameter (cm.) was measured at the middle part of the stalk.
3. Total soluble solids persentage (TSS%) was determined using hand refractometer from the sixth internode.
4. Sucrose/100 cm^3 of juice was determined using sacharemeter according to AOAC (1995).
5. Purity percentage was calculated according to the following equation:
   Purity % = Sucrose % x 100/Brix %.
6. Cane stalks of the three guarded rows were harvested, topped, cleaned, weighed and cane yield (tons/feddan) was calculated.
7. Sugar yield (tons/feddan) was estimated according to the following equation:
Raw sugar production = cane yield (tons/feddan) x recovery %.

Statistical analysis:

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

RESULTS AND DISCUSSION

1. Stalk height:

The results in Table (1) indicated that stalk height of the plant cane responded significantly to the applied doses of nitrogen fertilizer in 1995/1996 and 1996/1997 seasons. It was observed that stalk height increased gradually as nitrogen level increased up to 210 Kg N/fed; thereafter, a slight reduction was recorded at the highest N level (240 Kg/fed).

Stalk height of the first ratoon was insignificantly affected by nitrogen level up to 240 Kg/fed in 1996/1997 growing season. However, stalk height of the first ratoon in 1997/1998 season was positively influenced by increasing nitrogen level up to 240 Kg/fed. These results are in agreement with those found by Mali et al. (1982) and Banger et al. (1992).

Regarding the effect of row spacing on stalk height of the plant cane and/or its

first ratoon, the results illustrated that stalk height increased as the used row distances were widened from 80 to 100 and 140 cm apart. However, the positive effect of row spacing on stalk height was significant only for the plant cane in 1995/1996 season. This result is in line with that found by Abu-Bakr (1997). The increase in stalk height as affected by row spacing may be due to the fact that widening the distance between rows offers more favourable conditions such as light and sun for plant growth.

The results showed that there were no significant differences in stalk height due to the interaction between the studied factors for the first ratoons in 1996/1997 and 1997/1998 and the plant cane in 1995/1996 seasons. In general, the highest stalk height was recorded by growing plant and/or sugarcane ratoon in rows spaced at 120 cm and fertilized with 210 or 240 Kg N/fed.

2. Stalk diameter:

The collected data in Table (2) showed that there were no statistical differences in stalk diameter due to increasing the applied nitrogen doses from 150 up to 240 Kg/fed either for the two plant canes seasons or their first ratoons. However, it was noticed that applying 180 Kg N/fed was adequate to exhibit the highest values of stalk diameter for the plant cane in 1995/1996 growing season and its first ratoon in 1996/1997 one. Meanwhile, it was found that the application of 240 Kg N/fed was required for the plant cane plants in 1996/1997 season and its first ratoon in 1997/1998 to attain the highest stalk diameter. These results are in line with those found by El-Shafai (1997).

Significant differences in stalk diameter were observed due to increasing row width from 80 to 100 and 120 cm for the plant cane of 1996/1997 season. However, no significant differences were recorded under its first ratoon in 1997/1998 season. Opposite results were found for the plant cane in 1995/1996 season where stalk diameter did not significantly respond to the used row spacings while its first ratoon in 1996/1997 season was statistically influenced by row spacing up to 120 cm in respect to stalk diameter. It could be concluded that growing the plant cane and/or its first ratoon under the widest row spacing (120 cm) resulted in producing the highest values of stalk diameter. This result is in partial agreement with those reported by Prasad et al (1983).

No significant differences were recorded due to the interaction between the used levels of nitrogen and row spacings for the plant cane or first ratoon concerning root diameter.

Table 1. Effect of nitrogen and row spacing on stalk height (cm) of plant cane and first ratoon.

Plant cane										
Growing season	1995/1996					1996/1997				
Row spacing (cm)	Nitrogen (Kg N/fed)				Average	Nitrogen (Kg N/fed)				Average
	150	180	210	240		150	180	210	240	
80	218.0	221.5	223.0	223.0	221.3	210.2	215.7	219.7	220.0	216.4
100	225.2	227.2	233.0	228.0	228.3	211.7	222.7	228.2	222.0	221.1
120	232.0	241.0	247.0	243.0	240.7	220.2	226.0	233.2	230.7	227.5
Average	225.0	229.9	234.3	231.3	230.1	214.0	221.5	227.0	224.2	221.7
First ratoon										
Growing season	1996/1997					1997/1998				
80	212.0	214.2	225.2	222.7	218.5	210.0	247.5	257.2	262.2	244.2
100	215.5	225.0	225.7	231.2	224.3	250.0	256.5	262.2	262.0	257.6
120	227.0	226.5	230.7	227.5	227.9	256.7	262.5	271.5	275.7	266.6
Average	218.1	221.9	227.2	227.1	223.6	238.9	255.5	263.6	266.6	256.1

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	0.8	4.6	N.S.	12.5
Row spacing (B)	5.2	N.S.	N.S.	N.S.
	1.4	N.S.	N.S.	N.S.

Table 2. Effect of nitrogen and row spacing on stalk height (cm) for the plant cane and first ratoon.

Plant cane										
Growing season	1995/1996					1996/1997				
Row spacing (cm)	Nitrogen (Kg N/fed)				Average	Nitrogen (Kg N/fed)				Average
	150	180	210	240		150	180	210	240	
80	2.37	2.40	2.40	2.37	2.38	2.10	2.20	2.30	2.30	2.22
100	2.37	2.40	2.40	2.45	2.40	2.30	2.30	2.30	2.30	2.30
120	2.40	2.52	2.45	2.42	2.45	2.40	2.40	2.40	2.42	2.40
Average	2.38	2.44	2.41	2.41	2.41	2.26	2.30	2.33	2.34	2.31
First ratoon										
Growing season	1996/1997					1997/1998				
80	2.30	2.30	2.30	2.30	2.30	2.30	2.40	2.40	2.50	2.40
100	2.30	2.40	2.40	2.37	2.36	2.40	2.40	2.40	2.40	2.40
120	2.40	2.40	2.40	2.42	2.41	2.40	2.40	2.45	2.45	2.42
Average	2.33	2.37	2.36	2.36	2.36	2.36	2.40	2.41	2.45	2.40

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	N.S.	N.S.	N.S.	N.S.
Row spacing (B)	N.S.	0.05	0.02	N.S.
(A) x (B)	N.S.	N.S.	N.S.	N.S.

3. Sucrose percentage:

Data presented in Table (3) showed that applying nitrogen in the range of 150 - 240 Kg N/fed had no significant influence on sucrose percentage in juice of stalks of the two plant cane crops. The same observation was noticed for the two sugar cane ratoons concerning this trait. This result is in agreement with those reported by Singh et al. (1982) and Rvindra et al. (1989).

The results obtained showed that surcrose percentage of the plant cane in 1996/1997 season and its first ratoon in 1997/1998 were affected statistically by the used row spacings. On the contrary, no appreciable response was noticed in respect to this character for the plant cane of 1995/1996 and its first ratoon grown in 1996/1997 season. This result is in agreement with those reported by Devi et al. (1990).

Except for the first ratoon of 1996/1997 growing season, surcrose percentage was significantly affected by the interaction between the applied levels of nitrogen and row spacing for the other three sugarcane crops. The highest values of sucrose percentage were mostly obtained by applying the highest N level (240 Kg/fed) for sugarcane planted under 100 or 120 cm apart (for the plant cane crops) or 80 cm (for the two first ratoons). These findings indicated that adding 240 Kg N/fed was required particularly under narrow row width (80 cm) to feed efficiently higher number of cane tillers emerged under sugarcane ratoons (compared with those of the plant cane). The fulfillment of plant needs of nitrogen which is an essential nutrient for appropriate growth and photosynthesis reflected in producing higher values of sucrose percentage.

4. Total soluble solids percentage (TSS%):

The results in Table (4) showed that total soluble solids percentage in cane juice of the plant cane in 1995/1996 and its first ratoon responded significantly to the applied nitrogen levels. However, no statistical effect on TSS% due to N levels was recorded for the plant cane in 1996/1997 or its first ratoon. This result is in partial agreement with those found by Singh et al. (1982), Ravindra et al. (1989) and Abu-Bakr (1997). It was noticed that increasing N level up to 210 Kg/fed was accompanied by a gradual increase in TSS% and then a slight reduction was observed concerning the two plant canes. Similar trend was observed for the two ratoon crops up to the highest N level (240 Kg N/fed).

The results indicated no significant differences in TSS% due to increasing row spacing from 80 to 100 and 120 cm for the two plant cane crops and the first ratoon

Table 3. Effect of nitrogen and row spacing on sucrose percentage for the plant cane and first ratoon.

Plant cane										
Growing season	1995/1996					1996/1997				
Row spacing (cm)	Nitrogen (Kg N/fed)				Average	Nitrogen (Kg N/fed)				Average
	150	180	210	240		150	180	210	240	
80	17.37	17.20	17.22	16.87	17.16	17.27	16.70	17.22	16.37	16.89
100	16.87	17.22	16.97	16.97	17.01	16.97	17.12	17.00	17.37	17.11
120	16.20	17.15	17.35	18.00	17.17	16.20	16.60	16.50	16.87	16.54
Average	16.81	17.19	17.18	17.28	17.11	16.18	16.80	16.90	16.87	16.85
First ratoon										
Growing season	1996/1997					1997/1998				
80	19.15	19.50	19.10	19.50	19.31	21.75	22.00	22.00	22.10	21.96
100	18.57	18.50	18.90	18.90	18.71	21.60	21.37	21.07	20.32	21.09
120	18.70	17.92	18.50	18.70	18.45	20.50	21.20	21.37	21.47	21.13
Average	18.80	18.64	18.83	19.03	18.82	21.28	21.52	21.48	21.30	21.39

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	N.S.	N.S.	N.S.	N.S.
Row spacing (B)	N.S.	0.11	N.S.	0.19
(A) x (B)	0.45	0.36	N.S.	0.41

Table 4. Effect of nitrogen and row spacing on total soluble solids percentage for the plant cane and first ratoon.

Plant cane										
Growing season	1995/1996					1996/1997				
Row spacing (cm)	Nitrogen (Kg N/fed)				Average	Nitrogen (Kg N/fed)				Average
	150	180	210	240		150	180	210	240	
80	19.77	20.50	20.27	20.72	20.31	19.07	18.77	18.87	18.92	18.91
100	20.50	20.50	21.00	20.77	20.56	18.32	18.40	18.82	18.80	18.58
120	20.27	20.77	20.77	20.00	20.45	18.42	18.87	19.00	18.82	18.78
Average	20.18	20.59	20.68	20.33	20.44	18.60	18.68	18.90	18.85	18.76
First ratoon										
Growing season	1996/1997					1997/1998				
80	21.17	21.35	21.27	21.67	21.36	22.17	23.17	23.00	23.00	22.83
100	20.22	21.20	21.00	21.67	21.02	23.00	22.50	22.50	22.00	22.50
120	21.00	20.87	21.22	21.22	21.08	22.00	22.00	22.32	23.00	22.33
Average	20.80	21.14	21.16	21.52	21.15	22.39	22.55	22.60	22.66	22.55

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	0.18	N.S.	0.19	N.S.
Row spacing (B)	N.S.	N.S.	N.S.	0.16
(A) x (B)	0.31	N.S.	0.34	0.28

in 1996/1997 season. This result is in agreement with those found by Ravindra et al. (1989) and Abu-Bakr (1997). A slight reduction was mostly recorded in this character at the highest row width (120 cm) compared with the lowest (80 cm) or the middle one (100 cm).

The plant cane of 1995/1996 and the two first ratoons in 1996/1997 and 1997/1998 were significantly affected by the interaction between row spacing and nitrogen levels used concerning TSS%.

5. Purity percentage:

The results collected in Table (5) showed that nitrogen fertilizer did not significantly affect purity percentage for the two plant canes or their first ratoons. No clear cut trend could be observed regarding the effect of the applied levels on this trait. This result coincide with that illustrated by Ravidra et al. (1998).

Purity percentage was not generally affected by the used row spacings which succeeded to reach the level of significance in 1995/1996 regarding this character. This result is in line with those reported by Singh et al. (1982) and Jayabal and Chockalingam (1990). Meanwhile, it could be noticed that the highest values of purity percentage were mostly obtained from sugar cane planted in rows spaced at 80 cm.

The interaction between the studied levels of nitrogen and row spacing did not affect purity percentage of cane juice of the two sugaracne ratoons and the plant cane in 1995/1996 season.

6. Cane yield:

The collected data in Table (6) showed that cane yield (tons/fed) of the plant cane responded significantly to the applied doses of nitrogen fertilizer up to 210 Kg N/fed and thereafter a slight reduction in cane yield was recorded by applying the highest N level (240 Kg/fed). The same trend was observed under cane ratoons.

Increases in cane yield of the plant cane in 1995/1996 season amounted to 6.74 and 16.35% were attained by increasing the applied N level to 180 and 210 Kg/fed as compared with that produced by applying the lowest N level (150 Kg N/fed) being 13.71 and 28.46% for that in 1996/1997 season, respectively. Similarly, increasing the applied N level from 150 to 180 and 210 Kg/fed increased cane yield of the first ratoon in 1996/1997 by 8.62 and 26.11%, corresponding to 12.94 and 18.14% for the first ratoon of 1997/1998, respectively. The appreciable effect of increasing N level on cane yield may be due to its positive effect on both

Table 5. Effect of nitrogen and row spacing on purity percentage for the plant cane and first ratoon.

Plant cane										
Growing season	1995/1996				Average	1996/1997				Average
Row spacing (cm)	Nitrogen (Kg N/fed)					Nitrogen (Kg N/fed)				
	150	180	210	240		150	180	210	240	
80	87.37	83.87	84.95	81.37	84.39	90.85	89.10	91.60	86.60	89.53
100	82.30	84.02	80.87	83.12	82.58	92.67	93.05	90.32	92.47	92.13
120	79.90	82.82	83.72	90.00	84.13	87.95	88.85	87.02	89.85	88.41
Average	83.19	83.60	83.18	84.83	83.70	90.49	90.33	89.60	89.64	90.01
First ratoon										
Growing season	1996/1997					1997/1998				
80	90.40	91.35	90.50	90.00	90.56	97.97	94.95	95.67	96.10	96.17
100	90.85	87.05	90.40	86.30	88.65	93.90	95.00	92.55	91.50	93.23
120	84.67	85.97	87.75	88.12	86.63	93.27	96.37	95.77	93.42	94.71
Average	88.64	88.12	89.55	88.14	88.59	95.05	95.44	94.66	93.67	94.70

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	N.S.	N.S.	N.S.	N.S.
Row spacing (B)	0.96	N.S.	N.S.	1.05
(A) x (B)	2.02	N.S.	N.S.	N.S.

Table 6. Effect of nitrogen and row spacing on cane yield (tons/fed) for the plant cane and first ratoon.

Plant cane										
Growing season	1995/1996				Average	1996/1997				Average
Row spacing (cm)	Nitrogen (Kg N/fed)					Nitrogen (Kg N/fed)				
	150	180	210	240		150	180	210	240	
80	41.60	43.72	49.92	49.22	46.11	42.97	49.22	56.87	50.40	49.36
100	46.25	50.07	53.67	52.07	50.51	43.07	48.72	53.30	53.22	49.58
120	52.27	55.77	59.42	57.80	56.31	47.62	56.05	61.52	55.32	55.13
Average	46.70	49.85	54.34	53.03	50.98	44.55	50.66	57.23	52.98	51.35
First ratoon										
Growing season	1996/1997					1997/1998				
80	42.07	44.50	55.45	49.37	47.85	48.82	59.55	62.10	59.25	57.43
100	45.02	52.67	55.70	50.45	50.96	61.42	67.42	71.60	68.82	67.31
120	51.37	53.22	63.47	58.80	56.71	65.87	71.92	74.37	73.45	71.40
Average	46.15	50.13	58.20	52.87	51.84	58.70	66.30	69.35	67.17	65.38

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	0.82	1.11	0.90	1.23
Row spacing (B)	0.63	1.31	0.69	2.07
(A) x (B)	N.S.	1.92	1.57	2.14

stalk height (Table 1) and stalk diameter (Table 2) which could be attributed to the distinct role of nitrogen as an essential and structural element required in building up plant organs. These results are in agreement with those reported by Jayabal and Chockalingam (1990) and Patel et al. (1990).

The results obtained showed that cane yield was gradually and significantly affected by increasing row spacing from 80 to 100 and 120 cm. This finding was true under both plant cane and ratoon crops as illustrated in Table (6). Regarding the plant cane of 1995/1996 season, increasing row spacing to 100 and 120 cm. increased cane yield by 8.95 and 22.12% compared with that obtained under 80 cm apart, corresponding to 0.44 and 11.68% for the plant cane of 1996/1997, respectively. Also, increments in cane yield of the first ratoon of 1996/1997 amounted to 6.49 and 18.51% were recorded when row spacing was increased from 80 to 100 or 120 being 17.20 and 24.32% for the first ratoon in 1997/1998, respectively. The increase in cane yield following the increase in row spacing may be due to the increase in both stalk height and diameter (Table 1 and 2) which agrees with that found by Patel et al. (1990).

Data recorded pointed out that except for plant cane in 1996/1997, cane yields of the other sugarcance crops were significantly affected by the interaction between nitrogen and row spacing.

It could be recommended that planting sugarcane in rows spaced at 120 cm with the application of 210 kg N/fed could produce the highest cane yield either for the plant cane or first ratoon.

7. Sugar yield:

The results presented in Table (7) showed that sugar yield was significanly increased as the applied doses of nitrogen were increased up to 210 Kg N/Fed. This finding was fairly true under the two plant canes in 1995/1996 and 1996/1997 as well as their first ratoons. In 1995/1996 season, increasing N level applied to the plant cane from 150 to 180 and 210 kg N/fed resulted in increments in sugar yield amounted to 12.82 and 27.00%, respectively, corresponding to 12.42 and 24.00% for the plant cane in 1996/1997. Similar trend was observed regarding sugar yield obtained from cane ratoons where increments of 5.58 and 20.68% were recorded by applying 210 Kg N/fed compared with that produced by adding 150 or 180 Kg N/fed to the first ratoon in 1996/1997, respectively, being 14.97 and 19.14% for the two first ratoons, respectively. These results are in line with those reported by Prasad et al. (1991). Meanwhile, general reduction in sugar yield amounted to 2.42 and 3.32% were observed by applying 240 Kg N/fed compared with that attained by

adding 210 Kg N/fed being 5.75 and 3.96%, for the two ratoon crops, respectively.

The results in Table (7) indicated that sugar yield (tons/fed) was significantly affected by the used row spacings for both plant and ratoon cane crops. Increasing distance between rows from 80 to 100 and 120 cm increased sugar yield of the plant cane in 1995/1996 season by 11.80 and 31.19% corresponding to 1.52 and 7.62% for the plant cane of 1996/1997, respectively. Similarly, sugar yield of the first ratoon grown in 1996/1997 increased by 5.66 and 11.02% as a result of increasing distance between rows from 80 to 100 and 120 cm, respectively, being 11.04 and 19.11% for the ratoon crop of 1997/1998. The increase in sugar yield accompaning the increase in row spacing is probably due to its effect on cane yield (Table 6) where it is well known that sugar yield is mainly affected by cane yield. This result is in agreement with that found by Mali and Singh (1985).

Sugar yields of the two plant canes were significantly affected by the interaction between the row spacing and N level. However, no appreciable interaction influence on this trait was recorded under the two sugar cane ratoons. It could be concluded that the highest sugar yield was mostly obtained from sugar cane planted 120 cm. distance between rows of and fertilized with 210 Kg N/fed for plant and/or cane ratoon.

Table 7. Effect of nitrogen and row spacing on sugar yield (tons/fed) for the plant cane and first ratoon.

Plant cane										
Growing season	1995/1996					1996/1997				
Row spacing (cm)	Nitrogen (Kg N/fed)				Average	Nitrogen (Kg N/fed)				Average
	150	180	210	240		150	180	210	240	
80	5.22	5.52	6.67	6.32	5.93	5.25	5.50	6.87	5.97	5.90
100	5.82	6.67	7.12	6.92	6.63	5.20	5.92	6.32	6.52	5.99
120	6.55	7.60	8.50	8.50	7.78	5.50	6.50	6.67	6.72	6.35
Average	5.86	6.60	7.43	7.25	6.78	5.31	5.97	6.62	6.40	6.08
First ratoon										
Growing season	1996/1997					1997/1998				
80	5.62	6.10	6.96	6.70	6.35	7.67	9.35	9.77	9.40	9.05
100	5.96	6.67	7.40	6.80	6.71	9.42	10.32	10.57	9.90	10.05
120	6.67	6.52	7.67	7.35	7.05	9.55	10.97	11.40	11.20	10.78
Average	6.09	6.43	7.35	6.95	6.70	8.88	10.21	10.58	10.16	9.96

L.S.D. at 5% level for:

	Plant cane		First ratoon	
	1995/1996	1996/1997	1996/1997	1997/1998
Nitrogen level (A)	0.15	0.22	0.31	0.27
Row spacing (B)	0.09	0.16	0.08	0.27
(A) x (B)	0.26	0.38	N.S.	N.S.

REFERENCES

1. Abu-Bakr, M.B. 1997. Intercropping of some summer crops on spring sugar cane. M.Sc. Thesis, Agron. Dept., Fac. Agric., Minia Univ., Egypt.

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

3. Bangar, K.S., S.R. Sharma and O.P. Rathore. 1992. Correlation and regression studies between nitrogen levels and yield and quality parameters of sugar cane varities. Indian Sugar, 41 (10): 747-749.

4. Devi, C., K.L. Rao and D.V.M. Raju. 1990. Studies on the effect of row space and nitrogen on yield and quality of early maturing sugar cane varieties. Indian Sugar, 40 (7): 541-544.

5. El-Shafai, A.M.A. 1996. Water requirements of sugar cane under different levels of nitrogen fertilization. Ph.D. Thesis, Agron. Dept., Fac. Agric. at Moshtohor, Zagazig Univ., Egypt.

6. Jayabal, V. and S. Chockalingam. 1990. Effect of spacing, speed rate and nitrogen levels on yield and quality of sugar cane. Cooperative Sugar, 22 (3): 171-172.

7. Mali, A.L. and P.P. Singh. 1985. Quality of sugar cane as influenced by varieties in relation to varying row spacings. Indian Sugar, 35 (8): 451-456. G.B. Paut Univ., Pautnagar, India. [C.F. Hort. Absts., 1986, 56: 10191].

8. Mali, S.A.; K.R. Pawar and D.N. Borulkar. 1982. Yield contributing characters of three varieties of seasonal sugar cane as influenced by nitrogen and phosphate levels. Indian Sugar, 32 (2): 95-104.

9. Prasad, D., U.K. Prasad and P.K. Bose. 1983. Effect of pre-monsoon irrigation, nitrogen and spacing on the yield of sugar cane varieties. Indian. J. Agron., 28 (2): 131-133. [C.F. Hort. Absts., 1985, 55 (2): 1625].

10. Prasad, U.K., B.K. Verna and T.N. Prasad. 1991. Effect of irrigation and nitrogen on sugar cane (*Saccharun officinarum*) and sugar yield, water-use efficiency, soil-moisture depletion and nitrogen uptake in calcareous soil. Rajendra Agric. Univ., Pusa 848125, Bihar, India. Indian J. Agric. Sci., 60 (6): 396-401.

11. Ravindra, Thakur; R.C. Jain; S.R. Sharma; G.L. Thakur and D.P. Nema (1989). Response of promising early, mid-late and late varieties of sugar cane of the region to nitrogen application. Main Sugar Cane Res. Sta., R.A.K. College Agric., Sehore, (MP), India. Bhartiya Sugar, 15 (2): 9-12.

12. Singh, P.P., S.K. Saini and K. Kumar. 1982. Studies on plant density and nitrogen levels in sugar cane. Indian Sugar 32 (9) 581-585. Govind Ballabh Pant Univ. Agric. and Technol., Pantnagar, India. [C.F. Hort. Absts., 1983, 53 (7): 5578].

13. Snedecor, G.W. and W.G. Cochran. 1981. Statistical Methods. Seventh Ed. Iowa State Univ. Press, Ames, Iowa, USA.

المستوى الامثل من التخطيط والنيتروجين للقصب الغرس والخلفة الاولى للصنف المبشر اف ١٥٣

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اقيم هذا البحث بمحطة بحوث ملوى بمحافظة المنيا لدراسة تأثير مسافة التخطيط (٨٠ ، ١٠٠، ١٢٠سم) والسماد الازوتى (١٥٠ ، ١٨٠ ، ٢١٠، ٢٤٠ كجم ن/فدان) على محصول وجودة الصنف المبشر اف ١٥٣ للغرس والخلفة الاولى.

اوضحت النتائج المتحصل عليها ان قطر العيدان والنسبة المئوية للسكروز والنقاوة للقصب الغرس والخلفة الاولى لم يتاثرا معنويا بمستويات النيتروجين المضافة - الا ان طول العيدان قد استجاب معنويا لمستويات النيتروجين.

ازداد محصول العيدان والسكر معنويا وتدريجيا بزيادة مستوى النيتروجين حتى ٢١٠ كجم ن /فدان للغرس والخلفة الاولى.

اوضحت النتائج ان النسبة المئوية للسكروز والمواد الصلبة الذائبة الكلية للقصب الغرس فى موسم ١٩٩٥ / ١٩٩٦ والخلفة الاولى له لم تتاثر معنويا بمسافات الخطيط المستخدمة - الا ان النسبة المئوية للسكروز والمواد الصلبة الذائبة الكلية والنقاوة قد استجابت معنويا لمسافات الخطيط فى الخلفة الاولى موسم ١٩٩٧ / ١٩٩٨.