OPTIMIUM INTER-ROW SPACING AND NUMBER OF PLOUGHINGS FOR TWO PROMISING SUGARCANE VARIETES

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(Manuscript received 3 November 2010)

Abstract

The present work was conducted at El-Mattana Agricultural Research Station, Luxor Governorate during 2008/2009 and 2009/2010 seasons to assess the optimum inter-row spacing and number of ploughings for two promising varieties. The study included twelve treatments, which were the combinations among three enter-row spacing (80, 100 and 120 cm) and two ploughing treatments (two or three passes) for the two promising sugar cane varieties namely G.95-19 and G.95-21. Split-split plot design with four replications was used in both seasons.

The obtained results showed that the examined enter-row spacing significantly affected the number of millable canes/fed, millable cane height and diameter, as well as total soluble solids, sucrose, sugar recovery percentages, cane and sugar yields/fed. The closest enter-row spacing (80 cm) gave the highest values of all studied traits. Moreover, insignificant difference was found between 80 and 100 cm inter-row spacing in the number of millable cane/fed, millable cane height, sucrose and sugar yield. Number of millable canes/fed, millable cane height, stalk diameter, total soluble solids and cane yield were significantly affected by ploughing number. Furthermore, practicing three ploughing passes resulted in the highest values of the aforementioned characters, except for stalk diameter. The promising sugarcane variety G.95-21 significantly surpassed G.95-19 the other promising one in number of millable canes/fed, millable stalk height, millable cane diameter, total soluble solids percentage and cane yield/fed.

Under conditions of the present investigation, planting G.9 5-21 sugarcane variety in rows spaced at 100 cm along with three ploughings can be recommended to obtain the highest cane and sugar yield/fed.

INTRODUCTION

It is known that soil preparation is the corner stone for higher production as well as the nutritional status to maximize productivity vertically. Row spacing has a direct influence on plant population. It plays a distinct role in the amount of solar radiation intercepted and hence, crop canopy development which in turn affects photosynthesis and ultimately the dry matter produced by plant. Also, it may affect cane diameter, length and weight which contribute to cane yield. Meantime, the appropriate seed bed preparation help in increasing size of root system, i.e. increases its proliferation vertically and horizontally, which guarantee better absorption of nutrients, basal tellering and decrease lodging, which positively yield higher cane and sugar per feddan. (kanwar, *et al.*, 1988, El-Sayed, 2000, Shah-Nawaz, *et al.*, 2000, Raskar and Bhoi, 2003, Osman, *et al.*, 2004, Ahmed, *et al.*, 2005, El-Shafai and Ismail, 2006 and Ahmed and Khaled, 2008).

Many studies were carried out to evaluate sugarcane varieties for productivity and quality parameters under different agricultural treatments (Yadav and Sharma, 1980, Gowda, *et al.*, 2001, El-Geddawy, *et al.*, 2002, Sundara, 2003 and Taha, *et al.*, 2008).

The main objective of the present work was to find out the optimum inter-row space and number of ploughings for two promising sugarcane varieties which in order to achieve higher cane and sugar yields.

MATERALS AND METHODS

The present study was conducted at El-Mattana Agricultural Research Station, Luxor Governorate during 2008/2009 (plant cane crop) and 2009/2010 (first ratoon) seasons to assess the optimum inter-row spacing and number of ploughings for two promising varieties. The study included twelve treatments, which were the combinations among three inter-row spacing (80, 100 and 120 cm) and two ploughing treatments (two or three passes) for the two promising sugar cane varieties namely G.95-19 and G.95-21, which were planted during the first week of March for the plant cane using two rows of three-budded cane cuttings in planting. However, management of the first ratoon crop started during the second week of March after harvesting the plant cane.

Split-split plot design with four replications was used in both seasons. Inter-row spacings were arranged in the main plots, while number of ploughings were randomly distributed in sub-plots, and the sub-sub plots were assigned for the examined sugarcane varieties. The sub-sub-plot area was 60 m^2 (including 15, 12 and 10 rows in case of spacing 80, 100 and 120 cm spacings, respectively and 5 m in length). All the agronomic practices for growing sugar cane were done as recommended by the Sugar Crops Research Institute. Mechanical and chemical analyses of soil of the experimental site showed that soil was clay loam, containing 30, 9 and 205 ppm of the available N, P and K, respectively and a pH of 7.5.

Recorded data:

At harvest, the following characters were determined:

1. Number of millable cane per feddan (based on plot area).
2. Millable cane height (cm) was measured from soil surface up to the top visible dewlap.
3. Millable cane diameter (cm) was measured at the middle part of stalks.

A sample of twenty millable stalkes from each split-split plot was randomly taken, cleaned and crushed to determine total soluble solids and sucrose percentages of juice as follows:

4. Total soluble solids (TSS %) in juice (brix percentage) was determined using "Brix Hydrometer" according to A.O.A.C. (1995).
5. Sucrose percentage in juice was determined using "Saccharemeter" according to A.O.A.C. (1995).
6. Sugar recovery percentage in juice was calculated according to the equation described by Yadav and Sharma (1980):
   Sugar recovery % = [sucrose % - 0.4 (brix % - sucrose %)] x 0.73.
7. Cane yield (ton/fed) was calculated based on plot area.
8. Sugar yield (ton/fed) was estimated as follows:
   Sugar yield (ton/fed) = cane yield (ton/fed) x sugar recovery %.

Statistical analysis

All recorded data were statistically analyzed according to the method of Snedecor and Cochran (1981). Least significant difference test (LSD) at 5 % level of significance was used to compare means.

RESULTS AND DISCUSSION

1. Number of millable cane stalks/fed:

Data in Table 1 point out that number of millable cane was significantly and negatively influenced by increasing row spacing from 80 up to 120 cm in the 1st and 2nd seasons. This result could be due to indicated that shading and competition among plants at narrow spacing (80 cm) were very high and resulted in high mortality percentage, because among 63000 buds/fed planted, only 49.19 and 48.64 thousand millable cane stales/fed were harvested, in the 1st and 2nd season, respectively. Meanwhile, at the widest row distance (120 cm), planting 42000 buds/fed produced 45.80 and 44.54 thousand millable cane stales stalks /fed, probably due to lower competition and higher tillering ability resulted from the suitability of furrowing and earthing-up around plants. These results are in agreement with those mentioned by Shah-Nawaz, *et al.* (2000), Raskar and Bhoi (2003) and Sundara (2003) who found that planting canes in narrower rows of 75 cm produced the highest number of millable cane stalks.

Number of millable cane stalks/fed was significantly influenced by ploughing number in the two seasons. Carrying out three ploughing passes resulted in 0.97 and 1.07 thousand millable canes/fed higher than those produced by practicing two ploughing passes, in first and second season, respectively. These results are probably attributed to the fact that increasing ploughing number ensures favourable soil conditions for growth and an efficient function of root system, in addition to better aeration, availability of nutrients in the soil solution and basal tillering of stalks, and hence higher number of millable cane stalks /fed. Similar results were reported by El-Sayed (2000) and Ahmed, *et al.* (2005).

Results given in the same table revealed that evaluated sugarcane cvs. differed significantly in the number of millable cane stalks /fed in second season only. Sugarcane cv. G. 95-21 produced 0.57 thousand millable canes/fed higher than those recorded by G. 95-19. This result may be due to the genetic difference between the two varieties in tillering ability and capacity of producing more survive and harvestable stalks. Significant differences among cane cvs. in this trait were also reported by Gowda, *et al.* (2001), El-Geddawy, *et al.* (2002), and Taha, *et al.* (2008) who obtained significant differences among different varieties.

It could be noted that the number of millable cane/fed significantly responded to all possible interactions in the two crops except the interaction between number of ploughing and sugarcane varieties in second season. In general, it was found that preparing seed bed by ploughing soil in two passes and planting G.95-21 sugarcane variety in rows spaced at 80 cm gave the highest number of millable cane stalks /fed.

Table 1. Number of millable cane stalks (1000/fed) of the tested sugarcane varieties as affected by row spacing and number of ploughing passes.

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	47.07	51.00	49.03	46.69	50.02	48.35
	3	50.10	48.60	49.35	49.43	48.41	48.92
Average		48.58	49.80	49.19	48.06	49.22	48.64
100 cm	2	49.07	47.90	48.48	44.07	42.79	43.43
	3	49.33	47.67	48.50	47.65	46.20	46.93
Average		49.20	47.78	48.49	45.86	44.50	45.18
120 cm	2	45.17	43.87	44.52	45.42	44.51	44.97
	3	46.27	47.90	47.08	41.74	46.47	44.11
Average		45.72	45.88	45.80	43.58	45.49	44.54
B x C	2	47.10	47.59	47.34	45.39	45.77	45.58
	3	48.57	48.06	48.31	46.27	47.03	46.65
Mean		47.83	47.82		45.83	46.40	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	2.04	1.79
Ploughing number (B)	0.42	0.51
Cane variety (C)	N.S	0.51
A x B	0.72	0.89
A x C	0.72	0.89
B x C	0.59	N.S
A x B x C	1.02	1.26

2. Millable stalk height:

Results in Table 2 revealed that increasing row spacing from 80 to 100 and 120 cm led to a significant decrease in millable stalk height. The tallest stalks of sugarcane, grown either as plant or 1st ratoon, resulted from planting it in rows of 80-cm apart, in the 1st and 2nd seasons. These results are in accordance with those obtained by El-Shafai and Ismail (2006) and Ahmed and Khaled (2008) who came up with the same findings.

The results revealed that millable stalk height was significantly affected by ploughing number in both seasons. Results showed that ploughing three passes increases millable stalk height compared with ploughing in two passes. El-Sayed (2000) and Osman, *et al.* (2004) showed that millable stalk height was significantly affected by ploughing passes numbers.

Data in the same table clear that the tested sugarcane varieties differed significantly in millable stalk height in both seasons. Sugarcane G.95-21 variety appeared the superiority over G.95-19 variety in this trait. These results may be due to genetic differences among cane varieties. Similar results were given by Sundara (2003) and Taha, *et al.* (2008).

Moreover, the data showed that millable stalk height responded significantly to the interactions among studied factors, except that between ploughing passes number and varieties, in both seasons. The tallest millable stalk were obtained from G.95-21 variety planted after three ploughing passes in rows spaced at 80-cm apart.

Table 2. Millable stalk height (cm) of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	295.33	324.00	309.67	302.00	317.33	309.67
	3	313.33	300.00	306.67	306.67	306.67	306.67
Average		304.33	312.00	308.17	304.33	312.00	308.17
100 cm	2	285.00	279.67	282.33	290.00	286.67	288.33
	3	314.00	316.33	315.17	320.67	315.00	317.83
Average		299.50	298.00	298.75	305.33	300.83	303.80
120 cm	2	281.67	278.00	279.83	286.67	283.00	284.73
	3	272.00	295.33	283.67	277.00	300.33	288.67
Average		276.83	286.67	281.75	281.83	291.67	286.75
B x C	2	287.33	293.89	290.61	292.89	295.67	294.28
	3	299.78	303.89	301.83	301.44	307.33	304.39
Mean		293.56	298.89		297.17	301.50	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	12.32	9.02
Ploughing number (B)	2.88	3.36
Cane variety (C)	2.88	3.36
A x B	4.99	5.82
A x C	4.99	5.82
B x C	N.S	N.S
A x B x C	7.06	8.23

3. Millable stalk diameter:

Results in Table 3 showed that millable cane diameter was significantly affected by the inter-row spacing in the 2nd season only. However, it was observed that planting sugarcane in the widest inter-row spacing (120 cm) resulted in the thicker millable stalk compared with the narrower ones (80 or 100 cm). This result may be attributed to the great competition among plants in dense planting in case of narrow spacing on growth factors, i.e. nutrients and solar radiation, in addition to the negative influence of mutual shading. Similar results were reported by Shah-Nawaz, *et al.* (2000) and El-Geddawy, *et al.* (2002), who reported that the wider row spacing (140 cm) significantly recorded higher values of thicker stalks, compared with those of narrower spacing of 100 cm.

Also, the results showed that ploughing soil surface in two passes resulted in thicker cane stalks compared to that ploughed in three passes. This effect was significant in the 2nd season only. These results are in agreement with those obtained by El-Sayed (2000) and Osman, *et al.* (2004) who reported that number of ploughing attained a significant difference in stalk diameter as affected by ploughing passes number. The increase in millable cane diameter accompanied the reduction in ploughing number could be due to that increasing ploughing passes number directed plant potential to increasing its stalk height on the account of stalk diameter.

The tested sugarcane varieties differed significantly in millable stalk diameter. In both seasons, the thickset diameter was obtained by G. 95-21 variety. This result may be due to that G.95-21 variety had more growth vigour. El-Geddawy, *et al.* (2002) and El-Shafai and Ismail (2006) observed differences in stalk diameter among the tested varieties.

The results showed that stalk diameter was significantly affected by the possible interactions among the studied factors.

Table 3. Millable stalk diameter (cm) of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	2.77	2.85	2.81	2.84	2.92	2.88
	3	2.37	2.58	2.48	2.42	2.63	2.53
Average		2.57	2.72	2.64	2.63	2.78	2.70
100 cm	2	2.58	2.69	2.64	2.65	2.76	2.70
	3	2.80	2.68	2.74	2.87	2.75	2.81
Average		2.69	2.69	2.69	2.76	2.76	2.76
120 cm	2	2.76	2.51	2.63	2.81	2.56	2.68
	3	2.74	2.84	2.798	2.79	2.90	2.85
Average		2.75	2.68	2.71	2.80	2.73	2.77
B x C	2	2.70	2.69	2.69	2.76	2.75	2.75
	3	2.64	2.70	2.67	2.69	2.76	2.73
Mean		2.67	2.69		2.73	2.75	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	N.S	0.05
Ploughing number (B)	N.S	0.01
Cane variety (C)	0.01	0.01
A x B	0.05	0.02
A x C	0.05	0.02
B x C	0.04	0.02
A x B x C	0.06	0.03

4. Total soluble solids percentage in juice (brix percentage)

Results in Table 4 pointed out that total soluble solids (TSS%) was significantly influenced by row spacing treatments in the 2nd season. These results are in agreement with those reported by El-Sayed (2000) and Ahmed and Khaled (2008) who reported that that brix % was significantly affected by row spacing treatments.

Significant difference in brix % as affected by number of ploughing passes was found in the 2nd season. This result is in harmony with that obtained by El-Sayed (2000) and Osman, *et al.* (2004), who noted that number of ploughing passes had a significant difference in brix %.

Furthermore, results in the same table reveled that the examined sugar cane varieties varied significantly in TSS % in the plant cane and 1st ratoon crops. Sugarcane G.95-21 variety recorded the highest brix % in both seasons. Difference between the two varieties could be due to their genetic structure. which could be due to their genetic structure.. These results are in line with those obtained by Ahmed, *et al.* (2005) and Taha, *et al.* (2008) who found that exhibited statistical differences in Brix % among the studied cane varieties.

Brix % was significantly affected by the interaction among the three studied factors in the 2nd season.

Table 4. Brix percentage (T.S.S %) of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	21.13	21.40	21.27	21.63	21.90	21.77
	3	20.33	20.53	20.43	20.83	21.03	20.93
Average		20.73	20.97	20.85	21.23	21.47	21.53
100 cm	2	20.07	20.37	20.22	20.23	20.53	20.38
	3	21.30	21.70	21.50	21.80	22.20	22.00
Average		20.68	21.03	20.86	21.02	21.37	21.19
120 cm	2	20.53	20.83	20.68	21.03	21.33	21.18
	3	20.23	20.27	20.25	20.73	20.43	20.58
Average		20.38	20.55	20.47	20.88	20.88	20.88
B x C	2	20.58	20.87	20.72	20.97	21.26	21.11
	3	20.62	20.83	20.73	21.12	21.22	21.17
Mean		20.60	20.85		21.04	21.24	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	N.S	0.03
Ploughing number (B)	N.S	0.02
Cane variety (C)	0.15	0.02
A x B	0.20	0.03
A x C	N.S	0.03
B x C	N.S	0.03
A x B x C	N.S	0.04

5. Sucrose percentage:

Data in Table 5 reveal that sucrose percentage was significantly influenced by the inter-row spacing in the 1st ratoon crop. This finding is in agreement with that obtained by Sundara (2003) and Osman, *et al.* (2004), who reported that the studied row spacing had a significant difference in sucrose %.

Results in the same table showed no statistical difference in sucrose % due to the studied number of ploughing passes in the two seasons. Moreover, the tested cane varieties were not significantly different in sucrose % in both seasons. Similar results were reported by kanwar, *et al.* (1988), who found that cane varieties did not show any differences in quality parameters.

Sucrose percentage was significantly affected by the interactions between number of ploughing passes and sugarcane varieties in the first ratoon crop. The highest sucrose % was recorded by G.95-19 grown in soil ploughed three passes. The 2nd order interaction had a significant effect on this trait in the 1st ratoon crop. The maximum sucrose % was obtained from G.95-19 variety planted in soil ploughed three passes in rows spaced at 100-cm apart.

Table 5: Sucrose percentage of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	17.67	18.00	17.83	18.67	18.90	18.78
	3	17.00	17.00	17.00	17.90	17.93	17.92
Average		17.33	17.50	17.42	18.28	18.42	18.35
100 cm	2	16.67	16.67	16.67	16.97	17.07	17.02
	3	18.00	18.33	18.17	19.07	19.00	19.03
Average		17.33	17.50	17.42	18.02	18.03	18.03
120 cm	2	17.00	17.33	17.17	17.97	18.37	18.17
	3	17.00	16.67	16.83	17.90	16.73	17.32
Average		17.00	17.00	17.00	17.93	17.55	17.74
B x C	2	17.11	17.33	17.22	17.87	18.11	17.99
	3	17.33	17.33	17.33	18.29	17.89	18.09
Mean		17.22	17.33		18.08	18.00	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	N.S	0.37
Ploughing number (B)	N.S	N.S
Cane variety (C)	N.S	N.S
A x B	0.42	0.37
A x C	N.S	N.S
B x C	N.S	0.30
A x B x C	N.S	0.53

6. Sugar recovery percentage:

Data in Table 6 showed that sugar recovery percentage was significantly influenced by the inter-row spacing in the 1st ratoon crop. Planting sugarcane at 100-cm width gave the highest values of this trait compared with the other inter-row spacing. This result was in line with that reported by Sundara (2003) and Osman, *et al.* (2004), who reported that the row spacing attained a significant influence on the sugar recovery percentage.

The results cleared that sugar recovery % was insignificantly affected by number of ploughing passes in the 1st and 2nd seasons. This result coincides with those mentioned by Ahmed, *et al.* (2005), who found insignificant differences in sugar recovery % as affected by ploughing number. Meantime, the difference between the two sugarcane varieties was insignificant, in both crops. This result is in line with that obtained by Kanwar, *et al.* (1988), who found that cane varieties did not show any differences in quality parameters.

Sugar recovery % was significantly affected by the interaction between inter-row spacing and number of ploughing in both plant cane and first ratoon crops. Moreover, this trait was significantly affected by the second order interaction among the three studied factors, in the 1st ratoon. The highest mean value of sugar recovery % was obtained by growing G.95-19 sugarcane variety in soil ploughed three passes in rows spaced at 1oo-cm apart.

Table 6. Sugar recovery percentage of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	12.83	13.07	12.95	12.93	13.67	13.30
	3	12.20	12.23	12.22	12.93	12.23	12.58
Average		12.52	12.65	12.58	12.93	13.95	12.94
100 cm	2	12.60	11.93	12.27	14.00	12.30	13.15
	3	13.20	13.23	13.22	13.90	14.07	13.98
Average		12.90	12.58	12.74	13.95	13.18	13.57
120 cm	2	12.20	12.57	12.38	12.73	12.97	12.85
	3	12.13	11.83	11.98	12.40	12.90	12.65
Average		12.17	12.20	12.18	12.57	12.93	12.75
B x C	2	12.54	12.52	12.53	13.22	12.98	13.10
	3	12.51	12.43	12.47	13.08	13.07	13.07
Mean		12.53	12.48		13.15	13.02	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	N.S	0.62
Ploughing number (B)	N.S	N.S
Cane variety (C)	N.S	N.S
A x B	0.65	0.85
A x C	N.S	N.S
B x C	N.S	N.S
A x B x C	N.S	1.20

7. Cane yield:

Data in Table 7 pointed to a significant effect on cane yield due to the studied inter-row spacings in both plant and 1st ratoon crops. Increasing inter-row spacing from 80 to 100 and 120 cm led to a gradual decrease in cane yield in both cane crops. These results may be due to the fact that the narrower the inter-row spacing the higher the millable stalk number/fed and stalk height (Tables 1 and 2). Similar results were obtained by Shah-Nawaz, *et al.* (2000), Gowda, *et al.* (2001), El-Geddawy, *et al.* (2002) and El-Shafai and Ismail (2006), who found that planting sugarcane in rows spaced at 80-cm apart attained significant increases in cane yields/fed compared with 100 and 120 cm.

Data in the same table showed that plougings number had a significant influence on cane yield. Ploughing soil before planting three passes resulted in producing 0.94 and 1.01 tons of canes higher/fed than that ploughed in two passes, in the plant cane and first ratoon, respectively. These results may be due to higher millable stalk number/fed and cane height (Tables 1 and 2) recorded in case of preparing seed bed by ploughing soil in three passes compared to that ploughed in two passes, which may be due to the positive influence on germination, emergence and growth of cane plants. These results are in agreement with those obtained by El-Sayed (2000) and Ahmed, *et al.* (2005), who found that plouging number had a significant effect on cane yield.

Results showed a significant difference in cane yield between the two sugarcane varieties in first ratoon crop only. The variety G. 95-21surpassed G. 95-19 by, 0.49 ton /fed in the 2nd season. These results could be attributed to higher values of millble stalk number, height and diameter (Tables 1, 2 and 3) recorded by the 1st one. The effective role of varieties on cane yield was also reported by Gowda, *et al.* (2001), Sundara (2003) and Ahmed and Khaled (2008), who found that sugarcane varieties differed significantly in cane yields.

The results revealed that cane yield was significantly affected by the interactions between the studied factors in both crops, except that of ploughing number x cane varieties in the plant cane crop. The highest cane yield was obtained by planting sugarcane G.95-21 variety in rows of 80-cm apart after ploughing three passes.

Table 7. Net cane yield (tons/fed) of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	48.00	53.00	50.50	48.83	50.90	49.87
	3	51.00	49.33	50.17	50.63	50.17	50.40
Average		49.50	51.17	50.33	49.73	50.53	50.13
100 cm	2	50.00	49.33	49.67	46.53	44.87	45.70
	3	51.33	49.67	50.50	50.07	48.07	49.07
Average		50.67	49.50	50.08	48.30	46.47	47.38
120 cm	2	47.67	44.67	46.17	47.53	46.93	47.23
	3	47.33	49.67	48.50	43.57	49.17	46.37
Average		47.50	47.17	47.33	45.55	48.05	46.80
B x C	2	48.56	49.00	48.78	47.63	47.57	47.60
	3	49.89	49.56	49.72	48.09	49.13	48.61
Mean		48.89	49.28		47.86	48.35	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	2.15	1.40
Ploughing number (B)	0.30	0.50
Cane variety (C)	N.S	0.50
A x B	0.80	0.87
A x C	0.80	0.87
B x C	N.S	0.71
A x B x C	1.13	1.23

8. Sugar yield:

Data in Table 8 show that sugar yield was significantly affected by inter-row spacing in both of the plant cane and 1st ratoon crops, without significant variance between 80 and 100-cm rows. These results may be due to higher cane yield produced under narrower spacings (Table 7). These results are in line with those reported by El-Sayed (2000), Gowda, *et al.* (2001) and El-Shafai and Ismail (2006), who found that planting sugarcane in rows spaced at 80-cm apart attained significant increases in sugar yield/fed compared with that gained by planting it in rows spaced at 100 and 120 cm.

The results showed insignificant effect on sugar yield due to the number of ploughing passes in the 1st and 2nd seasons. Likewise, the difference between the tested varieties in sugar yield was not enough to reach the level of significance in both seasons.

Results in Table 8 cleared that sugar yield was significantly affected by the possible interactions of the studied factors in both seasons, except the interaction between the number of ploughing and varieties. The highest sugar yields were obtained from G.95-21 variety grown in rows of 80-cm apart after ploughing soil three passes.

Table 8. Sugar yield (tons/fed) of the tested sugarcane varieties as affected by row spacing and number of ploughing passes

Row Spacing	Number of Ploughing passes	Plant cane crop			First ratoon crop		
		G. 95-19	G. 95-21	Mean	G. 95-19	G.95-21	Mean
80 cm	2	6.16	6.93	6.55	6.32	6.95	6.63
	3	6.23	6.04	6.13	6.55	6.14	6.35
Average		6.19	6.49	6.34	6.43	6.54	6.49
100 cm	2	6.30	5.88	6.09	6.51	5.52	6.02
	3	6.78	6.57	6.68	6.96	6.76	6.86
Average		6.54	6.23	6.38	6.74	6.14	6.44
120 cm	2	5.81	5.60	5.71	6.05	6.09	6.07
	3	5.73	5.87	5.80	5.40	6.34	5.87
Average		5.77	5.74	5.75	5.73	6.21	5.97
B x C	2	6.09	6.14	6.11	6.29	6.18	6.24
	3	6.25	6.16	6.20	6.31	6.41	6.36
Mean		6.17	6.15		6.30	6.30	

LSD at 0.05 level for	Plant cane crop	First ratoon crop
Row spacing (A)	0.33	0.38
Ploughing number (B)	N.S	N.S
Cane variety (C)	N.S	N.S
A x B	0.32	0.42
A x C	0.32	0.42
B x C	N.S	N.S
A x B x C	0.45	0.60

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تحديد المسافة المثلى بين الخطوط وعدد مرات الحرث لصنفي قصب سكر مبشرين

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أجرى هذا البحث في مزرعة محطة البحوث الزراعية بالمطاعنة بمحافظة الأقصر في موسمي 2009/2008 و 2009/ 2010 لتحديد المسافة المثلى بين الخطوط وأفضل عدد مرات للحرث لإثنين من أصناف قصب السكر المبشرة. إشتملت الدراسة على إثنى عشر معاملة مثلت التوافقات بين ثلاثة معدلات للتخطيط هى 80 ، 100 و 120 سم ، والحرث مرتين أو ثلاثة مرات قبل الزراعة ، وصنفي قصب السكر هما جيزة 95-19 وجيزة 95-21.

وزعت المعاملات فى التصميم التجريبى "قطع منشقة مرتين" فى أربع مكررات حيث وضعت مسافات التخطيط فى القطع الرئيسية ، وعدد مرات الحرث فى القطع الشقية الأولى ، فى حين وزع الصنفان فى القطع الشقية الثانية .

أظهرت النتائج فروقاً معنوية يبن مسافات التخطيط المدروسة علي عدد العيدان القابلة للعصر/فدان وارتفاع وقطر العيدان والنسبة المئوية لكلٍ من المواد الصلبة الذائبة الكلية (البركس) والسكروز وناتج السكر النظري ، بالإضافة إلى محصولي العيدان والسكر/فدان. أعطت الزراعة على مسافة 80 سم بين الخطوط أعلى القيم في كل الصفات محل الدراسة ، بينما لم تكن هناك فروقاً معنوية بين معدلي التخطيط 80 و 100 سم في عدد العيدان القابلة للعصر/فدان وارتفاع العيدان والنسبة المئوية السكروز ومحصول السكر/فدان. تأثر عدد العيدان القابلة للعصر/فدان وارتفاع وقطر العيدان والنسبة المئوية للمواد الصلبة الذائبة الكلية ومحصول القصب النظيف/فدان معنوياً بعدد مرات الحرث ، وأدى الحرث ثلاث مرات للحصول على قيماً أعلى للصفات المدروسة فيما عدا قطر العيدان مقارنة بحرث التربة مرتين . أظهر الصف المبشر جيزة 95-21 تفوقاً معنوياً على الصنف جيزة 95-19 في صفات عدد العيدان القابلة للعصر/فدان وارتفاع وقطر العيدان ، بالإضافة إلى النسبة المئوية للمواد الصلبة الذائبة الكلية ومحصول القصب النظيف.

تحت ظروف هذا البحث يوصى بزراعة صنف القصب المبشر جيزة 95-21 في خطوط المسافة بينها 100 سم بعد إجراء الحرث ثلاث مرات للحصول على أعلى محصول عيدان وسكر/فدان .