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PRODUCTIVITY AND QUALITY OF SUGAR BEET AS AFFECTED BY PLANTING PATTERN, DENSITY AND SOME WEED CONTROL TREATMENTS.

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ABSTRACT

Two filed trails were conducted during two successive winter seasons of 2013/2014 and 2014/2015 to study the effect of two planting pattern, i.e. ridges, 55cm. width with planting on one side / ridge and terraces, 110cm. width with planting on both sides of the terrace, five weed control treatments, i.e. hand hoeing twice at 30 and 50 days from planting, Harness 84% EC at the rate of 750 $cm.^3$ as pre-emergence, Razor golde96% EC at the rate of 500 $cm.^3$ as post emergence, Harness 84% EC followed by hand hoeing, one month later and razor golde96% EC followed by hand hoeing, one month later and three planting spaces, i.e. 20,25 and 30cm. between hills on growth, yield and its components as well as quality of sugar beet (*Beta vulgaris* L.) variety Belino. A split-split plot design with four replications was used. The obtained results could be summarized as follows:

1- Planting pattern did not exhibit significant effect on dry weight of total leaved weeds. While hand hoeing twice at 30 and 50 days from planting gave the lowest dry weight of total leaved weeds in the first season(224.33g/m^2), while herbicide (Razor golde 96% EC) at rate of 500 $cm.^3$as post emergence followed by hand hoeing one month later gave the best treatment(89.88g/m^2) in second season. In first season, 25cm. between hills recorded marked decreased in dry weight of total leaved weeds (844.75g/m^2) compared with 20 and 30 cm. hill-spacing.

2- Planting pattern had highly significant effect on root fresh weight (g/p) as well as root length and diameter (cm.) in the first season. Planting on ridges surpassed planting on terraces in all traits except

loss sugar %, White sugar (ZB) % and Quality sugar (QZ) %. The best values were obtained by using Harness 84% EC followed by hand hoeing one month later obtained the best values for root diameter , fresh weight , root yield ton/fed, loss sugar %, White sugar (ZB) % and Quality sugar (QZ) % (11.48cm. , 2470.45g, 23.36 ton/fed, 1.95%, 17.38% and 89.93%), respectively . Planting space of 20 cm. between hills out yielded the best values for root length, root yield (ton / fed) and Gross sugar %, juice Purity% and White sugar (ZB) %.

Generally, it could be concluded that Planting sugar beet on ridges, 55cm. in width with planting on one side / ridge at 20 cm. between hills and using Harness 84% EC followed by hand hoeing one month later could be recommended to maximize the productivity and quality of sugar beet under the environmental conditions of Minia Governorate.

Keywords: Sugar beet, *Beta vulgaris* L, planting pattern, planting distance, hill spacing, weed control, yield, quality.

INTRODUCTION

Several investigations were conducted to study the effects of planting pattern, weed control treatments and planting spaces for maximizing yields of roots and sugar (t/fed) and improving quality of sugar beet juice, but there is no enough studies abowt plant distribution that help in having more of yield with high quality.

Plant distributions are considered one of the important tools to decrease weeds dry weight and maximize root yield and quality. In this regard, Ivaschenko and Melnik(1996) in their studies on the influence of crop density on weediness of beet crops on yields, found that crops are unable to resist first wave of weeds, however the crop density , it was found necessary to destroy weeds with any available agents during the first 50 days of crop growth . Crop with evenly distributed plants and stand densities of 110000-132000 plants/ha at harvest are capable of resisting the second wave of weeds right up to harvest. Alford *et al* (2003) showed that 38 cm. row spacing produced the least weeds in both seasons. On the other hand, planting space of 25 cm. resulted in the highest increase. Mahmoud (2005) mentioned that 10 cm. planting space recorded significant decrease in narrow, broad and total weeds at 90,120 days in both seasons. El-Bakary (2006) and Ismail and Allam (2007) found that row width and hill spacing significantly affected root fresh weight (g), root length and diameter, TSS %, sucrose %, root and sugar yields/fad in the two seasons. Nafei *et al* (2010) reported that increasing plant population from 28000 to 42000 plants/fed. caused a significant response in root length and diameter, fresh weight/plants, sucrose%, total soluble solids, phosphorus% in roots as well as top,

root and sugar yields (ton/fed) in both seasons. Zahoor *et al* (2010) indicated that, sugar beet characters of root diameter (cm.),mean root weight (kg), sugar %, purity % and sugar yield (ton/ ha) were significantly affected by different planting methods except root length. Shalaby *et al* (2011) revealed that increasing plant spacing from 15 to 25 cm. significantly increased root length , root diameter , root fresh weight/ plant(g), sucrose%, root and sugar yields/fed) and impurities% i.e. nitrogen (N), sodium (Na) and potassium (K) in both seasons. The highest mean values of root length and diameter and fresh weight/plant (g) and root and sugar yields/fed were obtained by 25 cm. plant spacing in both seasons. Abdou *et al* (2014) found that plant distributions significantly affected sugar beet root fresh weight and root length in both seasons and root diameter in the first season. Planting on the two sides of terrace, 80 cm. width surpassed planting on the two sides of terrace, 100 cm. width in the most of traits values in both seasons.

Weeds are considered one of the most agricultural problems in sugar beet fields. Because weeds caused losses in yield and its quality. Reduction in sugar beet yield caused by weed competition depend on its characterized by their slow rate of growth during the early growth stages, i.e. from emergence to singling during which they may be heavily infested with weeds. So, the final stand of beet plants and their yields are reduced. Weed removal from sugar beet field at the 3 to 6 leaf stage, increased root yield by 31-40 %.(Tyla and Petroviene, 1996). Abo El-Hassan, Rasha (2010) found that root length, root diameter, root weight, top fresh weight, top yield, root yield, sucrose percentage and sugar yield of sugar beet were significantly affected by weed control treatments in both growing seasons, whereas total soluble solids (T.S.S.) % and purity % did not significantly affected by weed control treatments. Mirshekari *et al* (2010) revealed a decrease in root yield of sugar beet from 75t/ha to 58t/ha when 16 redroot pigweed/m of row allowed to interfere for whole season, compared to weed free for whole season. Odero *et al* (2010) found that the root and sucrose yield losses per hectare were increased as weeds density increased. Amiri (2013) reported that yield of sugar beet achieved more than 43 ton/ha in application of herbicides at two stages, while sugar beet yield in application at one stage was less than 27 ton/ha with significant difference at 5% level between them. The rate of yield in control treatment was 6 ton/ha, whereas yield in weeding treatment was more than 52 ton/ha with significant difference at 5% level. Spangler *et al* (2014) reported that the highest yields were achieved when weeds were controlled before reaching 2 cm. tall. Delaying weed control until weeds were 8 or 15 cm. tall reduced yield by 15%, whereas 30-cm.-tall weeds reduced yield up to 21%. Recoverable white sucrose/ ha (RWSH) also was reduced by 8 to

16% if weeds were 8 cm. tall. RecentlyNowar (2016) indicated that using two hand hoeing at 4 and 7 weeks after planting resulted in a significant increase of root yield and its components and gross sugar yield in comparison with other weed control treatments. Also, he cleared that there are non-significant differences between weed removal treatments on total soluble solids (T.S.S %) in the first season, while this trait was significantly affected in the second season. All weed removal treatments increased T.S.S%, on the other hand purity % of sugar beet increased without any significant difference between different weed removal and weed infestation treatments in both seasons. The present study, aimed to measure productivity and quality of sugar beet as affected by planting pattern, density and some weed control treatments.

MATERIALS AND METHODS:

The present investigation was carried out at the Experimental Farm of Faculty of Agriculture, Minia University, Egypt during two successive winter seasons of 2013/2014 and 2014/2015 to study the effect of planting pattern , weed control treatments and Planting spaces:

A- Planting pattern:

A1: Ridges, 55cm. in width with planting on one side

A2: Terraces, 110cm. width with planting on both sides of the terrace.

B-weed control treatments:

B1: Hand hoeing twice at 30 and 50 days from planting.

B2: Herbicide (Harness 84% EC) at the rate of 750 $cm.^3$ in 200 liter/fed.as pre-emergence (after planting before first irrigation).

B3: Herbicide (Razor golde96%EC) at the rate of 500 $cm.^3$ in 200 liter/fed. as post emergence (at 2:3 leaves sugar beet plants).

B4: Herbicide (Harness 84% EC) at the rate of 750 $cm.^3$ in 200 liter/fed. as pre-emergence (after planting before the first irrigation) followed by hand hoeing, one month later.

B5: Herbicide (Razor golde96%EC) at the rate of 500 $cm.^3$ in 200 liter/fed. as post emergence (at 2:3 leaves sugar beet plants) followed by hand hoeing, one month later.

C-Planting spaces:

C1:20cm. between hills.

C2: 25 cm. between hills.

C3: 30 cm. between hills.

The three distances among hills on the ridges, 55cm. in width with planting on one side / ridge, or Terraces, 110cm. width with planting on both sides give 36000, 30000 and 24000 plant/fed, respectively.

A split-split plot design with four replications was used, planting pattern was randomly arranged in the main plots, weed control treatments were randomly allocated in the sub-plots and planting spaces were distributed at random in the sub-sub plots.

Plot area was 10.5 m^2 (1/400 fed.), involving 6 ridges (55cm. apart) or 3 terraces (110 cm. apart) and 3.18 m. long. Sugar beet cultivar "Belino" (*Beta vulgaris* L.) was sown on 10th and 17th October in 2013 and 2014, respectively. Harvesting date was on 15th and 20th May in 2014 and 2015, respectively. The preceding summer crop was maize (*Zea mays* L.) in both seasons.

Phosphorus fertilizer was added at land preparation at the rate of 30 kg P_2O_5 /fed in the form of calcium super-phosphate 15.5% P_2O_5, Nitrogen fertilizer was applied in the form of urea (46.5 % N) at rate of 80 kg N /fed, in two equal doses; the first dose after thinning and the second was applied after one month later. Potassium was added with the first nitrogen dose at the rate of 50 kg K_2O/fed in form of potassium sulfate 48% K_2O. The other cultural practices of sugar beet were done as recommended by Ministry of Agriculture for sugar beet in the district.

STUDIED CHARACTERS*:*

A- Weeds characters:

Weeds were hand pulled from one square meter chosen at random in each sub-sub plots at 90 days from planting, to record:

1- Dry weight of total annual weeds (g/m^2).

Weeds were air-dried for seven days and then were oven dried at 70^{oC} for 48 hr, until a constant weight was reached. The dry weight of weeds for each group (g/m^2) was recorded

B-Root yield attributes:

At harvest in both seasons, five guarded plants from each sub-sub plots were randomly chosen from the two inner ridges and harvested to determine the following traits:-

2- Root length (cm.).
3- Root diameter (cm.).
4- Root fresh weight (g/plant).

C- Root yield (t/fed):

The three guarded rows of each sub-sub plots were harvested topped, cleaned and weighted in kg, then it was converted to estimate:

5- Root yield (ton / fed).
6- Top yield (ton / fed).

D- Quality parameters and sugar yield:

All percentages as gross sugar, potassium (K), sodium (Na) and α-amino nitrogen were determined in Egyptian sugar &Integrated industries company (Limited Laboratories at Abu Korkas, El-Minia) , Egypt to estimate the following parameters:

1-Gross sugar % (pol reading% or sucrose %).Sugar content was estimated in fresh samples of sugar beet root by means of an Automatic Sugar Polarimetric; according to the method of Mc Ginnus (1971) .

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

$$\text{Purity\%} = \frac{\text{Sucrose\%}}{\text{T.S.S. \%}} \text{ X } 100$$

According to Carruthers *et al* (1962).

3- Loss sugar % = Gross sugar % - white sugar %.

4- Extractable white sugar % (ZB).

Corrected sugar content (white sugar) of roots was calculated by linking the root non-sugar K, Na and

α- amino (expressed as mill equivalent/100g of root) according to Harvey and Dotton (1993). as follows :

ZB = pol – [0.343(K+Na)+0.094 NBi +0.29]

Where :

ZB = corrected sugar content (% per beet) or extractable white sugar.

Pol= gross sugar %.

N Bi= α- amino – N.

5- Quality percentage (Qz): Qz=(ZB/ pol)x100 .

Statistical analysis:

All data were statistically analyzed according to technique of analysis of variance (ANOVA) for the split-split plot design with four replications by means of "MSTAT-C" computer software package as mentioned by Gomez and Gomez (1984).and least significant differences (L.S.D.) method was used for comparing among treatment means at 5%level of probability.

RESULTS AND DISCUSSION

1- Weeds characters:

Results presented in Table (1) show the influence of planting pattern , weed control treatments and planting spaces as well as their interactions on dry weight of total leaved weeds (g/m^2) at 90 days from planting in both 2013/2014 and 2014/2015 seasons. Planting pattern did not exhibited significant effect on total dry weight of leaved weeds in both seasons. However, weed control treatments had significant effect on reducing the dry weight of total leaved weeds (g/m^2) in both seasons. The application of hand hoeing twice at 30 and 50 days from planting gave the lowest dry weight of total leaved weeds in first season ($224.33g/m^2$), while herbicide (Razor golde 96%EC) at the rate of 500 $cm.^3$ as post emergence followed by hand hoeing, one month later was the best treatment which recorded the minimum total dry leaved weeds ($89.88g/m^2$) in the second season. These results may be due to that hoeing sugar beet fields more frequently reduced the growth of weeds. These results are in agreement with those obtained by Odero *et al* (2010), Spangler *et al* (2014) and Nowar (2016).

The Planting spaces had significant effect on dry weight of total leaved weeds in the first season only. Planting space of 25cm. between hills gave the lowest value of dry weight of leaved weeds ($844.75g/m^2$) compared with 20 and 30 cm. planting spaces. The reduction in dry weight of total leaved weeds (g/m^2) which was accompanied to higher plant spaces may be due to the competition between plants and weeds for various growth elements. Generally the results, are like those obtained by Ivaschenko and Melnik (1996), Alford *et al* (2003) and Ismail and Allam (2007).

The interaction between planting pattern and weed control treatments had significant effect on dry weight of total leaved weeds in first season only. Twice hand hoeing with planting on one side / ridge gave the highest decrease in this trait.

The interaction between weed control treatments and planting spaces

had significant effect on the dry weight of total leaved weeds in both seasons. Twice hand hoeing with 20 cm. plant spacing gave the lowest values for this trait i.e., 165.38 and 36.25g/m^2 in first and second seasons, respectively.

The interaction between planting pattern , weed control treatments and planting spaces had a significant effect on dry weight of total leaved weeds in first season only. Twice hand hoeing with planting on one side of ridges, 55cm. and 20 cm. between hills minimized dry weight of total leaved weeds (128.25 g/m^2)

2- Sugar beet characters:

2-1- Root fresh weight and dimensions:

Data presented in Tables (2 and 3) show the effect of planting pattern, weed control treatments and planting spaces as well as their interactions on root characteristics in terms of root dimensions and root fresh weight at harvest in both seasons. Planting pattern had highly significant effect on root fresh weight in both seasons and first season for root diameter. Planting on ridges, 55cm. width surpassed planting on terraces, for all traits in both seasons These obtained results may be due to the facts that hill dimensions; allow high amounts of light to pass to individual plants which were reflected on photosynthesis process, consequently root fresh weight, and it increase the soil volume which feed plants since it decreases the competitions among beet roots. Similar results were stated by El-Bakary (2006) and Abdou *et al* (2014).

Weed control treatments had significant effect on all these traits in the first season only. The application of herbicide (Razor golde96%EC) followed by hand hoeing, one month later resulted in the tallest roots (40.36cm.). However, application of Harness followed by hand hoeing; one month later recorded the highest values for root diameter and fresh weight of 11.48cm. and 2470.45g, respectively. These results may be due to the role of herbicide in decreasing weed competition, at the same time hoeing the sugar beet fields is very important not only for weed control but also to create suitable environmental condition i.e. good aeration, high biotic activity and increasing availability of some nutrients for sugar beet plants. These results are in agreement with those obtained by Tyla and Petroviene (1996),Abo El-Hassan, Rasha (2010) Odero *et al* (2010)and Spangler *et al* (2014) .

Planting spaces had significant effect on all root characteristics in first season and on root length in second season. Planting at 20cm. between hills gave the tallest roots of 39.38 and 42.31cm. in the first and second season, respectively. On the other hand, plant spacing of 30 cm. gave the highest root diameter and root weight in the first season. The increase in root length and the decrease in root diameter and fresh weight of narrow hill-spacing could be due to the competition between plants for light, water and depletion of nutrients. These results are in agreement with those

obtained by El-Bakary (2006), Ismail and Allam (2007) and Abdou *et al* (2014).

The interaction between planting pattern and weed control treatments had a significant effect on root characteristics in the first season and on root length and root fresh weight in the second season. However, the interaction between planting pattern and planting spaces had significant effect on root length and root diameter in the first season and only on root fresh weight in the second season. Moreover, the interaction between weed control treatments and planting spaces possessed significant effect on root diameter in both seasons and on root length and root fresh weight in the first and second seasons, respectively. The second order of interaction had significant effect on all root characteristics in the first season and on root length in the second season.

2-2- Root, Top yield (ton/fed) and Gross sugar % (pol reading %)

Data presented in Tables (4 and 5) show the effect of planting pattern, weed control treatments and planting spaces as well as their interactions on root and top yields, (ton / fed) as well as Gross sugar % at harvest in both seasons. The results cleared that planting pattern had significant effect on all these traits in the first season; in addition to top yield (ton/fed) and Gross sugar % in the second season. Planting on ridges, 55cm. width on one side / ridge; surpassed planting on terraces, 110cm. width for all above traits in both seasons except Gross sugar % in second season. These results may be due to the increase the amounts of light coming to individual plants and it increased the soil volume in which feed plants since it decreased the competitions among beet roots. Similar results were stated by El-Bakary (2006) and Ismail and Allam (2007).

Regarding the effect of weed control treatments on root and top yields (ton / fed) and Gross sugar %, it was concluded that these traits were significantly affected in both seasons except top yield in the second season. The application of Harness followed by hand hoeing, resulted the highest values for root and top yields (ton/fed) of 23.36 and 6.79 , respectively in the first season, while herbicide (Razor golde) followed by hand hoeing, resulted in the highest values for these traits i.e., 21.41 and 7.78 ton/fed, respectively in the second season. The greatest gross sugar % (19.33 and 18.75) were obtained with using Harness and twice hand hoeing in first and second seasons, respectively. Such effect can be attributed to increasing averages of root weight, root diameter and root length with hoeing. These results are in harmony with those obtained by Abo El-Hassan, Rasha (2010) Odero *et al* (2010), Amiri(2013)and Spangler *et al* (2014).

Concerning, the effect of planting spaces, it was concluded that all the above studied characteristics were significantly affected in both seasons except top yield in second season. Planting space of 20cm. between hills gave the heaviest root and top yields (ton / fed) and the highest Gross sugar

% in both seasons. In general, planting in 20cm. between hills, it was more uniformity than other densities because it had higher LAI as it affects the amount of radiation penetrating the canopy and reaching to all leaves which were reflected in the increase of root yield per unit area when extra plants are overcrowded per row. These results, are in agreement with those gained by El-Bakary (2006), Ismail and Allam (2007), Nafei *et al* (2010), Zahoor *et al* (2010) and Abdou *et al* (2014).

The interaction effect between planting pattern and weed control treatments on root and top yields (ton / fed) as well as Gross sugar % was significant in the first season and on Gross sugar % in second season; the greatest root and top yields (ton / fed) of 29.47 and 9.61(ton/fed), respectively were obtained by the application of Harness followed by hand hoeing, under planting on ridges, 55cm. width.

The interaction effect between planting pattern and planting spaces was significant on gross sugar% and root yield in both first and second seasons respectively; the highest values of gross sugar % of 19.47 and 18.83 were recorded for planting on one side of ridges with 20 cm. apart and on both sides of terraces and 20 cm. apart in the first and second seasons, respectively, while the highest value of root yield (23.75 ton/fed)was recorded for plants on ridges with 25cm. apart in the second season.

In both seasons, significant effect was noticed by planting spaces × weed control treatments interaction on all characteristics in both seasons; except top yield (ton / fed) in second season.

The interaction between planting pattern, weed control treatments and planting spaces had significant effect on all present studied traits in the first season and on Gross sugar % in the second season.

2-3- Purity% and loss sugar %

Data presented in Table (6) revealed that planting pattern had significant effect on loss sugar % in second season only. The lowest value of loss sugar % (2.08%) was obtained by Planting on terraces. Similar results were stated by Ismail and Allam (2007) and Shalaby *et al* (2011).

The effect of weed control treatments was significant on loss sugar % in both seasons. The application of Harness resulted in the best value of loss sugar % (1.95%) in the first season. However, twice hand hoeing resulted in the best value for this trait (1.99%) in the second season. These results are in harmony with those obtained by Odero *et al* (2010) Nowar (2016).

Moreover, the effect of planting spaces was significant on the two traits in the first season only. Plant spacing of 20cm. between hills gave the highest juice Purity% (80.23%); however the lowest loss sugar % (1.86%) was achieved by plant spacing of 25cm. between hills. These results are in agreement with those gained by El-Bakary (2006), Ismail and Allam (2007), Nafei *et al* (2010), Zahoor *et al* (2010) and Shalaby *et al* (2011).

The interaction effect of planting pattern and weed control treatments on Purity% and loss sugar % was significant on the two traits in the first season and on loss sugar % in second season. Moreover, the effect of planting pattern and planting spaces was significant on these traits in both seasons except purity% in second season. The interaction effect between weed control treatments and planting spaces was significant on these traits in the first season only. The effect of interaction between planting pattern, weed control treatments and planting spaces was significant on the two studied traits in the first season and loss sugar % in the second season.

2-4- White sugar (ZB) % and Quality sugar (QZ) %:

Data presented in Table (7) showed that the two traits were significantly affected by planting pattern in the second season. The highest value of White sugar (ZB) % and Quality sugar (QZ) % of 16.64% and 88.87, respectively; were obtained by Planting on terraces. Similar results were reported by Shalaby *et al* (2011) and Abdou *et al* (2014).

Regarding the effect of weed control treatments, it was concluded that White sugar (ZB) % and Quality sugar (QZ) % were significantly affected by weed control treatments in both seasons. The application of Harness resulted the best values for White sugar (ZB) % and Quality sugar (QZ) % of 17.38% and 89.93%, respectively, in first season. However twice hand hoeing resulted in the best values of 16.75 % and 89.34%, in the second season. These results are in harmony with those obtained by Odero *et al* (2010) Nowar (2016)

The effect of planting spaces was significant on Quality sugar (QZ) % and White sugar (ZB) % in first and second seasons, respectively. Planting space of 25cm. between hills outyielded the highest value for Quality sugar (QZ) % (89.82%). However the highest White sugar (ZB) % (16.56%) was achieved by plant spacing of 20cm. between hills. These results are in agreement with those obtained by El-Bakary (2006), Ismail and Allam (2007), Nafei *et al* (2010), Zahoor *et al* (2010) and Shalaby *et al* (2011).

The interaction effect of planting pattern and weed control treatments on White sugar (ZB) % in both seasons and Quality sugar (QZ) % in first season was significant. Moreover, planting pattern × planting spaces interaction had significant effect on the two studied traits in the first season. The interaction between weed control treatments and planting spaces possessed significant effect on the two traits in both seasons. The effect of second order interaction was significant on the two studied traits in the first season and White sugar (ZB) % in the second season.

Table (1): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on dry weight of total leaved weeds (g/m2) at 90 days from planting in2013/2014 and 2014/2015 seasons.

planting pattern	**weed control**	**90 DAP**							
		2013/2014				2014/2015			
		planting spaces			mean	planting spaces			mean
		c1	c2	c3		c1	c2	c3	
A1	B1	128.25	115.75	220.50	154.83	57.75	130.25	182.15	123.38
	B2	2819.00	1564.25	2601.50	2328.25	215.25	438.75	143.15	265.72
	B3	1138.50	945.25	2054.75	1379.50	339.25	360.05	404.05	367.78
	B4	452.00	352.25	659.00	487.75	118.75	106.98	129.65	118.46
	B5	560.75	550.50	510.50	540.58	117.50	59.25	74.20	83.65
Mean		1019.70	705.60	1209.25	**978.18**	169.70	219.06	186.64	**191.80**
A2	B1	202.50	444.00	235.00	293.83	14.75	128.80	175.00	106.18
	B2	2665.00	708.50	3251.25	2208.25	103.00	376.25	181.65	220.30
	B3	2576.00	2494.50	1932.25	2334.25	555.25	289.50	489.95	444.90
	B4	745.50	844.50	885.25	825.08	266.50	171.40	78.15	172.02
	B5	790.50	428.00	4251.25	1823.25	106.60	93.50	88.25	96.12
Mean		1395.90	983.90	2111.00	**1496.93**	209.22	211.89	202.60	**207.90**
Mean of B	B1	165.38	279.88	227.75	224.33	36.25	129.53	178.58	114.78
	B2	2742.00	1136.38	2926.38	2268.25	159.13	407.50	162.40	243.01
	B3	1857.25	1719.88	1993.50	1856.88	447.25	324.78	447.00	406.34
	B4	598.75	598.38	772.13	656.42	192.63	139.19	103.90	145.24
	B5	675.63	489.25	2380.88	1181.92	112.05	76.38	81.23	89.88
Mean of c		**1207.80**	**844.75**	**1660.13**	**1237.56**	**189.46**	**215.47**	**194.62**	**199.85**
LSD5%	A				-				-
	B				333.8				129.30
	AB				472.1				-
	C				369.8				-
	AC				-				-
	BC				826.8				134.60
	ABC				1169				-

Table (2): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on root length ,diameter (cm) and root fresh weight(g) at harvest in 2013/2014 season .

planting pattern	**weed control**	**Root length(cm)**				**Root diameter(cm)**				**Root fresh weight(g)**			
		planting spaces			mean	planting spaces			mean	planting spaces			mean
		c1	c2	c3		c1	c2	c3		c1	c2	c3	
A1	B1	41.50	37.50	39.00	39.33	9.90	12.45	11.83	11.39	1725.25	3228.13	2428.63	2460.67
	B2	36.95	39.75	35.25	37.32	9.93	9.73	10.63	10.09	1294.25	1167.70	2033.70	1498.55
	B3	38.33	35.70	38.95	37.66	11.35	10.60	10.90	10.95	2188.58	1659.00	1991.83	1946.47
	B4	40.63	40.75	34.45	38.61	13.40	11.78	12.40	12.53	3106.08	2731.83	3455.50	3097.80
	B5	43.83	41.88	36.50	40.73	11.33	10.85	11.65	11.28	2202.50	2049.38	2269.95	2173.94
Mean		40.25	39.12	36.83	**38.73**	11.18	11.08	11.48	**11.25**	2103.33	2167.21	2435.92	**2235.49**
A2	B1	38.70	44.50	40.50	41.23	10.50	11.65	11.58	11.24	1823.75	1813.83	2022.38	1886.65
	B2	36.50	36.13	35.45	36.03	9.53	9.65	9.43	9.53	1036.75	952.63	1212.75	1067.38
	B3	32.50	34.50	37.50	34.83	7.40	10.30	9.95	9.22	600.13	1383.38	1274.13	1085.88
	B4	41.58	44.00	35.33	40.30	10.23	9.93	11.18	10.44	1451.95	2069.38	2007.95	1843.09
	B5	43.25	37.70	39.00	39.98	11.48	11.10	10.48	11.02	2071.58	1734.25	1917.63	1907.82
Mean		38.51	39.37	37.56	**38.48**	9.83	10.53	10.52	**10.29**	1396.83	1590.69	1686.97	**1558.16**
Mean of B	B1	40.10	41.00	39.75	40.28	10.20	12.05	11.70	11.32	1774.50	2520.98	2225.50	2173.66
	B2	36.73	37.94	35.35	36.67	9.73	9.69	10.03	9.81	1165.50	1060.16	1623.23	1282.96
	B3	35.41	35.10	38.23	36.25	9.38	10.45	10.43	10.08	1394.35	1521.19	1632.98	1516.17
	B4	41.10	42.38	34.89	39.45	11.81	10.85	11.79	11.48	2279.01	2400.60	2731.73	2470.45
	B5	43.54	39.79	37.75	40.36	11.40	10.98	11.06	11.15	2137.04	1891.81	2093.79	2040.88
Mean of c		**39.38**	**39.24**	**37.19**	**38.60**	**10.50**	**10.80**	**11.00**	**10.77**	**1750.08**	**1878.95**	**2061.44**	**1371.82**
	A				-				**				**
	B				0.96				0.48				199.7
	AB				1.35				0.68				282.4
	C				0.94				0.28				200.1
	AC				1.33				0.395				-
	BC				2.10				0.62				-
	ABC				2.97				0.88				632.8

Table (3): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on root length ,diameter (cm) and root fresh weight(g) at harvest in 2014/2015 season .

planting pattern	**weed control**	**Root length(cm)**				**Root diameter(cm)**				**Root fresh weight(g)**			
		planting spaces			mean	planting spaces			mean	planting spaces			mean
		c1	c2	c3		c1	c2	c3		c1	c2	c3	
A1	B1	38.75	37.13	42.75	39.54	10.06	11.68	11.93	11.22	1546.75	1463.50	1696.38	1568.88
	B2	35.63	36.50	41.00	37.71	11.39	11.00	12.36	11.58	1608.75	1272.00	1296.88	1392.54
	B3	56.88	36.50	40.50	44.63	11.03	10.91	11.25	11.06	1164.38	1182.50	1553.00	1299.96
	B4	40.50	38.00	39.50	39.33	12.60	13.45	10.45	12.17	1258.75	1920.25	1421.25	1533.42
	B5	45.50	40.25	44.88	43.54	10.71	13.29	12.85	12.28	991.88	1451.88	1655.50	1366.42
Mean		43.45	37.68	41.73	**40.95**	11.16	12.07	11.77	**11.66**	1314.10	1458.03	1524.60	1432.24
A2	B1	40.63	43.00	43.75	42.46	12.09	11.74	10.08	11.30	1106.25	1173.00	900.88	1060.04
	B2	40.75	36.38	35.88	37.67	10.14	9.66	10.84	10.21	1161.88	807.38	693.50	887.58
	B3	37.88	37.63	42.25	39.25	11.46	10.78	11.01	11.08	1451.00	1254.00	835.63	1180.21
	B4	46.50	40.50	42.25	43.08	10.79	10.41	10.58	10.59	1131.00	1557.00	946.00	1211.33
	B5	40.13	40.50	40.00	40.21	9.20	12.40	10.51	10.70	1046.00	1751.88	1136.13	1311.33
Mean		41.18	39.60	40.83	**40.53**	10.74	11.00	10.60	**10.78**	1179.23	1308.65	902.43	1130.10
Mean of B	B1	39.69	40.06	43.25	41.00	11.08	11.71	11.00	11.26	1326.50	1318.25	1298.63	1314.46
	B2	38.19	36.44	38.44	37.69	10.76	10.33	11.60	10.90	1385.31	1039.69	995.19	1140.06
	B3	47.38	37.06	41.38	41.94	11.24	10.84	11.13	11.07	1307.69	1218.25	1194.31	1240.08
	B4	43.50	39.25	40.88	41.21	11.69	11.93	10.51	11.38	1194.88	1738.63	1183.63	1372.38
	B5	42.81	40.38	42.44	41.88	9.96	12.84	11.68	11.49	1018.94	1601.88	1395.81	1338.88
Mean of c		**42.31**	**38.64**	**41.28**	**40.74**	**10.95**	**11.53**	**11.19**	**11.22**	**1246.66**	**1383.34**	**1213.51**	**1281.17**
	LSD5%												
	A				-				-				**
	B				-				-				-
	AB				4.67				-				257.60
	C				2.41				-				-
	AC				-				-				253.10
	BC				-				1.61				400.20
	ABC				7.65				-				-

Table (4): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on Root yield (ton / fed), Top yield (ton / fed) and Gross sugar % (pol reading%)at harvest in 2013/2014 **season.**

planting pattern	**weed control**	**Root yield (ton / fed)**				**Top yield (ton / fed)**				**Gross sugar % (pol reading%)**			
		planting spaces			mean	planting spaces			mean	planting spaces			mean
		c1	c2	c3		c1	c2	c3		c1	c2	c3	
A1	B1	20.73	30.98	17.50	23.07	7.23	9.48	5.58	7.43	19.03	17.33	16.13	17.49
	B2	15.53	11.20	14.68	13.80	3.80	2.50	3.13	3.14	20.13	20.75	19.85	20.24
	B3	26.30	15.90	14.35	18.85	2.95	4.15	2.10	3.07	19.70	20.48	20.05	20.08
	B4	37.28	26.25	24.88	29.47	11.43	7.93	9.48	9.61	19.23	19.20	17.35	18.59
	B5	26.45	19.68	16.35	20.83	6.20	3.75	4.63	4.86	19.28	18.73	18.30	18.77
Mean		25.26	20.80	17.55	**21.20**	6.32	5.56	4.98	**5.62**	19.47	19.30	18.34	**19.03**
A2	B1	21.90	16.13	14.75	17.59	5.45	2.70	3.43	3.86	19.53	17.25	19.80	18.86
	B2	12.45	9.15	8.73	10.11	3.10	1.65	1.63	2.13	18.15	16.45	20.63	18.41
	B3	7.20	13.28	9.18	9.88	2.20	3.40	2.43	2.68	19.18	18.03	18.33	18.51
	B4	17.43	19.88	14.45	17.25	4.05	4.00	3.85	3.97	17.40	17.88	18.48	17.92
	B5	24.85	16.68	13.80	18.44	5.83	5.63	3.53	4.99	20.03	16.83	19.40	18.75
Mean		16.77	15.02	12.18	**14.66**	4.13	3.48	2.97	**3.52**	18.86	17.29	19.33	**18.49**
Mean of B	B1	21.31	23.55	16.13	20.33	6.34	6.59	4.50	5.81	19.28	17.29	17.96	18.17
	B2	13.99	10.18	11.70	11.95	3.45	2.08	2.38	2.63	19.14	18.60	20.24	19.33
	B3	16.75	14.59	11.76	14.37	2.58	3.78	2.26	2.87	19.44	19.25	19.19	19.29
	B4	27.35	23.06	19.66	23.36	7.74	5.96	6.66	6.79	18.31	18.54	17.91	18.25
	B5	25.65	18.18	15.08	19.63	6.01	4.69	4.08	4.93	19.65	17.78	17.91	18.45
Mean of c		**21.01**	**17.91**	**14.87**	**17.93**	**5.22**	**4.62**	**3.98**	**4.60**	**19.16**	**18.29**	**18.83**	**18.76**
	LSD 5%												
	A				**				**				*
	B				1.88				-				0.58
	AB				2.66				0.59				0.83
	C				1.99				0.62				0.49
	AC				-				-				0.70
	BC				4.47				1.38				1.11
	ABC				6.31				1.95				1.57

Table (5): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on Root yield (ton / fed), Top yield (ton / fed) and Gross sugar % (pol reading%)at harvest in 2014/2015eason.

planting pattern	**weed control**	**Root yield (ton / fed)**				**Top yield (ton / fed)**				**Gross sugar % (pol reading %)**			
		planting spaces			mean	planting spaces			mean	planting spaces			mean
		c1	c2	c3		c1	c2	c3		c1	c2	c3	
A1	B1	22.65	24.63	20.06	22.44	6.83	9.48	7.98	8.09	18.96	18.17	18.32	18.49
	B2	21.17	21.71	17.98	20.29	7.68	10.14	9.10	8.97	18.18	18.58	18.99	18.58
	B3	19.91	19.50	18.89	19.43	7.10	10.32	9.03	8.81	18.47	18.33	17.72	18.17
	B4	24.11	24.18	16.52	21.60	12.13	7.72	6.43	8.76	19.45	17.55	17.11	18.04
	B5	16.87	28.72	26.08	23.89	11.38	7.14	7.34	8.62	18.37	17.23	18.07	17.89
Mean		20.94	23.75	19.90	**21.53**	9.02	8.96	7.97	**8.79**	18.69	17.97	18.04	**18.23**
A2	B1	28.24	20.62	11.22	20.03	8.88	6.35	4.49	6.57	18.71	19.16	19.15	19.01
	B2	18.08	12.10	7.97	12.71	6.46	4.17	2.86	4.50	18.90	19.90	18.07	18.96
	B3	26.77	19.55	11.44	19.25	7.29	4.92	7.61	6.60	18.31	18.15	18.59	18.35
	B4	25.79	20.39	10.53	18.90	7.43	5.83	3.58	5.61	18.53	17.98	18.70	18.40
	B5	16.56	25.11	15.12	18.93	5.83	7.60	7.37	6.93	19.73	18.62	19.14	19.16
Mean		23.09	19.55	11.25	**17.96**	7.18	5.77	5.18	**6.04**	18.83	18.76	18.73	**18.77**
Mean of B	B1	25.44	22.62	15.64	21.23	7.86	7.91	6.23	7.33	18.86	18.66	18.74	18.75
	B2	19.62	16.90	12.98	16.50	7.07	7.16	5.98	6.73	18.54	18.83	18.53	18.63
	B3	23.34	19.53	15.16	19.34	7.19	7.62	8.32	7.71	18.39	18.24	18.15	18.26
	B4	24.95	22.29	13.52	20.25	9.78	6.77	5.00	7.18	18.99	17.76	17.90	18.22
	B5	16.71	26.91	20.60	21.41	8.60	7.37	7.35	7.78	19.05	17.92	18.61	18.53
Mean of c		**22.01**	**21.65**	**15.58**	**19.75**	**8.10**	**7.37**	**6.58**	**7.35**	**18.76**	**18.28**	**18.39**	**18.48**
	LSD 5%												
	A				-				*				**
	B				3.06				-				0.25
	AB				-				-				0.36
	C				3.05				-				0.16
	AC				4.32				-				0.23
	BC				6.82				-				0.36
	ABC				-				-				0.51

Table (6): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on purity % and Loss sugar% in 2013 /2014 and 2014 /2015 seasons.

planting pattern	weed control	purity %								Loss sugar%							
		2013/2014				2014/2015				2013/2014				2014/2015			
		planting spaces			mean	planting spaces			mean	planting spaces			mean	planting spaces			mean
		c1	c2	c3		c1	c2	c3		c1	c2	c3		c1	c2	c3	
A1	B1	78.84	71.57	63.26	71.22	82.61	80.50	77.07	80.06	1.78	1.95	2.05	1.93	2.06	2.75	2.05	2.29
	B2	83.23	82.38	82.33	82.64	80.62	76.92	77.69	78.41	2.33	2.03	1.98	2.11	2.35	2.13	2.34	2.27
	B3	77.40	80.00	82.77	80.05	75.46	74.83	73.47	74.59	2.20	2.08	1.70	1.99	2.55	2.17	2.15	2.29
	B4	83.01	77.25	74.82	78.36	85.49	79.03	74.31	79.61	3.13	2.00	2.38	2.50	2.64	2.67	2.11	2.47
	B5	80.85	80.67	78.30	79.94	79.13	73.33	77.07	76.51	1.95	2.00	2.23	2.06	2.17	2.58	2.13	2.29
Mean		80.66	78.37	76.29	**78.44**	80.66	76.92	75.92	**77.83**	2.28	2.01	2.07	**2.12**	2.36	2.46	2.16	**2.32**
A2	B1	84.71	73.48	86.12	81.44	82.25	79.56	79.87	80.56	1.85	1.95	2.40	2.07	1.91	1.92	1.75	1.86
	B2	74.69	69.16	90.12	77.99	81.24	80.09	74.14	78.49	1.80	1.50	2.05	1.78	2.34	1.98	1.99	2.10
	B3	83.51	79.10	73.22	78.61	75.80	70.99	75.60	74.13	2.00	1.60	2.70	2.10	2.00	1.95	2.36	2.10
	B4	70.86	81.81	76.18	76.28	76.56	79.79	85.94	80.76	2.00	1.90	2.13	2.01	1.81	2.14	2.39	2.11
	B5	85.18	69.66	84.10	79.65	79.49	80.33	84.05	81.29	2.03	1.63	1.88	1.84	2.14	2.33	2.22	2.23
Mean		79.79	74.64	81.95	**78.79**	79.07	78.15	79.92	**79.05**	1.94	1.72	2.23	**1.96**	2.04	2.06	2.14	**2.08**
Mean of B	B1	81.77	72.52	74.69	76.33	82.43	80.03	78.47	80.31	1.81	1.95	2.23	2.00	1.99	2.10	1.90	1.99
	B2	78.96	75.77	86.22	80.32	80.93	78.50	75.91	78.45	2.06	1.76	2.01	1.95	2.35	2.06	2.17	2.19
	B3	80.45	80.02	77.99	79.49	75.63	72.91	74.54	74.36	2.10	1.84	2.20	2.05	2.27	2.06	2.25	2.20
	B4	76.93	79.53	75.50	77.32	81.02	79.41	80.12	80.19	2.56	1.95	2.25	2.25	2.22	2.40	2.25	2.29
	B5	83.01	75.17	81.20	79.79	79.31	76.83	80.56	78.90	1.99	1.81	2.05	1.95	2.15	2.45	2.17	2.26
Mean of c		**80.23**	**76.60**	**79.12**	**78.65**	**79.86**	**77.54**	**77.92**	**78.44**	**2.11**	**1.86**	**2.15**	**2.04**	**2.20**	**2.21**	**2.15**	**2.19**
	LSD5%%																
	A				-				-				-				*
	B				-				-				0.17				0.09
	AB				4.89				-				0.24				0.13
	C				3.12				-				0.08				-
	AC				4.41				-				0.11				0.18
	BC				6.97				-				0.17				-
	ABC				9.86				-				0.25				0.40

Table (7): Effect of planting pattern , weed control treatments and planting spaces as well as their interactions on Extractable white sugar % (Z B) and Quality sugar % (Q Z) in 2013 /2014 and 2014 /2015 seasons

planting pattern	weed control	White sugar % (Z B)								Quality sugar %(Q z)							
		2013/2014			mean	2014/2015			mean	2013/2014			mean	2014/2015			mean
		planting spaces				planting spaces				planting spaces				planting spaces			
		c1	c2	c3		c1	c2	c3		c1	c2	c3		c1	c2	c3	
A1	B1	17.25	15.38	14.08	15.57	16.90	15.90	16.27	16.35	90.73	88.78	87.23	88.91	89.12	87.49	88.79	88.46
	B2	17.80	18.73	17.88	18.13	15.83	16.44	16.66	16.31	88.40	90.30	89.93	89.54	87.08	88.51	87.71	87.76
	B3	17.50	18.40	18.35	18.08	15.92	16.16	15.57	15.88	88.33	90.00	91.23	89.85	86.18	88.16	87.79	87.38
	B4	16.10	17.20	14.95	16.08	16.81	14.88	15.00	15.56	83.83	89.60	86.18	86.53	86.52	84.76	87.65	86.31
	B5	17.30	16.70	1.05	11.68	16.19	14.64	15.95	15.59	89.78	89.18	87.80	88.92	88.19	85.01	88.24	87.14
Mean		17.19	17.28	13.26	**15.91**	16.33	15.60	15.89	**15.94**	88.21	89.57	88.47	**88.75**	87.41	86.78	88.03	**87.41**
A2	B1	17.65	15.28	17.43	16.78	16.80	17.24	17.40	17.15	90.53	88.65	88.03	89.07	89.80	90.00	90.85	90.22
	B2	16.35	14.95	18.58	16.63	16.56	17.11	16.08	16.58	90.05	90.88	90.05	90.33	87.62	89.62	88.99	88.74
	B3	17.18	16.43	15.63	16.41	16.31	16.20	16.23	16.25	89.70	91.00	84.98	88.56	89.10	89.25	87.28	88.54
	B4	15.38	15.95	16.35	15.89	16.71	15.84	16.31	16.29	88.48	89.40	88.38	88.75	90.25	88.09	87.16	88.50
	B5	17.95	15.20	17.55	16.90	17.59	16.30	16.93	16.94	89.83	90.45	90.28	90.18	89.19	87.50	88.37	88.35
Mean		16.90	15.56	17.11	**16.52**	16.80	16.54	16.59	**16.64**	89.72	90.08	88.34	**89.38**	89.19	88.89	88.53	**88.87**
Mean of B	B1	17.45	15.33	15.75	16.18	16.85	16.57	16.83	16.75	90.63	88.71	87.63	88.99	89.46	88.74	89.82	89.34
	B2	17.08	16.84	18.23	17.38	16.19	16.77	16.37	16.44	89.23	90.59	89.99	89.93	87.35	89.07	88.35	88.25
	B3	17.34	17.41	16.99	17.25	16.12	16.18	15.90	16.06	89.01	90.50	88.10	89.20	87.64	88.70	87.54	87.96
	B4	15.74	16.58	15.65	15.99	16.76	15.36	15.65	15.92	86.15	89.50	87.28	87.64	88.38	86.43	87.41	87.40
	B5	17.63	15.95	16.80	16.79	16.89	15.47	16.44	16.27	89.80	89.81	89.04	89.55	88.69	86.25	88.31	87.75
Mean of c		**17.05**	**16.42**	**16.68**	**16.72**	**16.56**	**16.07**	**16.24**	**16.29**	**88.96**	**89.82**	**88.41**	**89.06**	**88.30**	**87.84**	**88.28**	**88.14**
	LSD5%																
	A				-				**				-				*
	B				0.64				0.27				1.01				0.54
	AB				0.90				0.38				1.40				-
	C				-				0.20				0.63				-
	AC				0.76				-				0.88				-
	BC				1.20				0.45				1.40				5.54
	ABC				1.70				0.25				1.98				-

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إنتاجية وجودة بنجر السكر وتأثرها بنمط وكثافة النباتات وبعض معاملات مقاومه الحشائش

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اجريت تجربتان حقليتان بالمزرعة البحثيه –كلية الزراعة – جامعة المنيا خلال موسمى الزراعة الشتويه 2013 /2014 و 2014 /2015 بغرض دراسة تأثير نمطين للزراعة (1– الزراعه على جانب واحد من الخط عرض 55سم. 2– الزراعة على جانبى مصطبه بعرض

110سم)، وتـأثيرخمس طـرق لمقاومـه الحشـائش (1- العزيـق مـرتين عنـد عمـر 30 ،50 يـوم مـن الزراعــة، 2- مبيــد هــارنس 84% بمعــدل 750 ســم^3/فــدان بعــد الزراعــة وقبــل الــرى، 3- مبيــد رازورجولـد 96% بمعـدل 500سـم^3 عنـد عمـر مـن 2 :3 ورقـات حقيقيـه للبنجـر، 4- مبيـد هـارنس 84% بمعـدل 750 سـم^3/فـدان بعـد الزراعـة وقبـل الـرى متبوعـا بعزقـه بعـد شـهر مـن المعاملـة ، 5- مبيـد رازورجولـد 96% بمعـدل 500 سـم^3 عنـد عمـر مـن 2 :3 ورقـات حقيقيـه للبنجـر متبوعـا بعزقـة بعـد شـهر مـن المعاملـة) ، وكـذلك تـأثيرثلاث مسـافات للزراعـة (20، 25 و 30 سـم بـين الجـور) على إنتاجية وجودة بنجر السكر صنف " بلينو".

نفـذت التجـارب بترتيـب القطـع المنشـقة مـرتين فـى اربـع مكـررات فـى تصـميم القطاعـات الكاملـه العشـوائية ، حيـث وزع نمـط الزراعـة علـى القطـع الرئيسـية ووزعـت طـرق مقاومـه الحشـائش علـى القطـع الشـقية عشـوائيا ووزعـت مسـافات الزراعـة عشـوائيا علـى القطـع التحـت شـقية. ويمكـن تلخـيص أهم النتائج المتحصل عليها فيما يلى:

- لـم يكـن لتغيـر نمـط الزراعـة تـأثيرا" معنويـا علـى الـوزن الجـاف للحشـائش الكليـة،بينما العزيـق مـرتين عنـد عمـر 30 ،50 يـوم مـن الزراعـة أعطـى أقـل وزن جـاف للحشـائش الكليـه (224.33 جـم/ م^2) فـى الموسـم الاول . بينمـا أعطـى مبيـد الحشـائش رازورجولـد + عزقـه أقـل وزن جـاف فـى الموسـم الثـانى (89.88 جـم/ م^2). مسـافة الزراعـة 25 سـم بـين الجـور أعطـت أقـل وزن جـاف للحشـائش الكليـة (844.75 جـم/ م^2) مقارنـة بمسـافة 20 ، 30 سم بين الجور.
- كـان لـنمط الزراعـة تـأثيرا" معنويـا" علـى الـوزن الطـازج وطـول وقطـر الجـذر فـى الموسـم الأول . كمـا تفوقـت الزراعـة علـى خطـوط علـى الزراعـة علـى مصـاطب فـى جميـع الصـفات تحت الدراسة ما عدا نسبة السكر المفقود ونسبة السكر الأبيض ومعامل الجودة.
- أدى إسـتعمال مبيـد الحشـائش هـارنس 84% متبوعـا" بعزقـة بعـد شـهر مـن معاملـة الـرش إلـى الحصـول علـى أعلـى القـيم لصـفات طـول وقطـر ووزن الجذرومحصـول الجـذور بـالطن /ف ونسبه السكر المفقود ونسبة السكر الابيض ومعامل الجودة.
- وكانـت الزراعـة علـى مسـافة 20سـم بـين الجـورهي الأعلـى فـى قـيم كـل الصـفات السـابق ذكرها.
- وعمومـا" يتضـح مـن النتـائج أن زراعـة بنجـر السـكرعلى خطـوط بعـرض 55 سـم بمسـافة 20سـم بـين الجـور وإسـتعمال مبيـد هـارنس84% متبوعـا" بعزقـة بعـد شـهر مـن المعاملـة أدى للحصول على محصول عالى ذو جودة عالية تحت ظروف محافظة المنيا.