MECHANICAL AND MANUAL SOWING AND HOEING PROCESSES IN RELATION TO CHEMICAL CONSTITUENTS AND YIELD COMPONENTS OF SUGAR BEET

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Abstract

This experiment was carried out in two successive seasons (2007-2008 and 2008-2009) at Sakha Agriculture Research Station, Kafr El-Sheikh Governorate. To study the response of sugar beet yield and quality to the use of different planters compared to traditional sowing method in combination with different hoeing methods. The present work included fifteen treatments represent the combination between four planter machines compared to traditional planting method (manual) and three weed control methods i.e. manual hoeing, mechanical hoeing in addition to hoeing + post emergence herbicide (metamitron) Goltix. A split plot design in four replications was used. The main plot was devoted to planter machines treatments, meanwhile, the three weed control practices were randomly distributed in the sub plot. The obtained results showed that the types of planter had a significant increment on the yield in terms of root, top and sugar yield ton/fad. with the superiority of planter type M3. Also the root dimensions in terms of root length and diameter and root volume was statistically affected On the other hand the chemical constituents i.e. impurities (Na, K and α-amino nitrogen %) and quality % was not affected by the type of planter compared to the manual sowing. Meanwhile, TSS % was significantly decreased under the manual sowing, where sucrose % was highly significant at using planter type M3. Concerning the hoeing methods, the mechanical hoeing significantly surpassed the traditional hoeing and hoeing + goltix. This result was true under all studied vegetative characteristics, chemical constituents and yield components.

INTRODUCTION

The total potential losses from weeds would be between 50 and 100% of the potential crop yield. Sugar beet is not competitive with emerging weeds until it has at least 8 true leaves. Weed control in sugar beet relies on a sequence of herbicide applications. Over 50% of the UK crop is treated with glyphosate or paraquat +/− diquat prior to crop emergence. Much of the glyphosate is applied in the autumn or winter to control weeds present in the preceding stubble prior to ploughing, with the rest applied to control weeds emerging after ploughing (May, 2001).

Weed density and community composition were assessed yearly in all crops just before post-emergence herbicide application. In general, total weed density was higher in LIS than in CS and differences between the two systems were more pronounced in durum wheat. Averaged over four years, the weed density in LIS was 175% higher than in CS in sorghum, 113% in sugar beet, 128% in sunflower, and 471% in durum wheat. Differences in relative densities of major weed species were often inconsistent across management systems and years, but abundance of some species (e.g. *Lolium spp.*) seemed to be favored by LIS. The results are discussed from a cropping system perspective (Barberi and Bonari, 2005).

As weeding has traditionally been a labour intensive operation in crop production. The use of herbicides was rapidly accepted by many farmers and became an accepted part of crop husbandry, although a few farmers always questioned the widespread use of chemicals in farming, and the concept of organic farming necessitated a non-chemical approach to weed control. The recent upsurge in environmental awareness of the public, interest in organic food production and some problems with herbicide use, has led to a range of techniques and machines being developed for non-chemical weed control. Thermal and mechanical techniques are reviewed for cereal and row crop production (Parish, 1990).

As for most mechanical weeding operations crop plant losses always occur. Especially if high weed control efficiencies are aimed at. Crop losses result from soil coverage, crop leaf damage, root damage and disturbance. The standard hoe setting for the untreated crop row strips is 10 cm which gives approximately a maximum of 80 % area treatment e.g. in sugar beet. This row band width is measured as a row clearance between the hoe units tools e.g. shares. Most crop losses are due to soil disturbance close to crop plants. A conflict of aims appears between i) maximizing treated area to increase weeding efficiency and ii) minimizing crop losses by keeping a sufficient distance to crop rows. Therefore the adjustment of the hoe unit working width becomes an important factor for achieving an acceptable cultivation result (Griepentrog *et al.*, 2006)

As agriculture became mechanized cultivation techniques for weed control were developed, particularly for inter-row work in widely spaced row-crops. Inter-row cultivations for weed control in potatoes can cause problems of clod formation and variations on the traditional equipment design were developed (Green, 1962). Derylo, (1991) compared between chemical and mechanical weeding for weed control in sugar beet. He found that mechanical control reduce number and Dm of weeds from 3.5-16.0 plants and 0.5-13.9 g respectively. Whereas, Manual weeding resulted in

100% weed control in sugar beet(Povilaitis *et al*, 1992) giving the highest sucrose percentage, root and sugar yield (ton/fed) Abd El-Aal (1995).

Hoeing twice during the growing season was sufficient to provide good weed control, and acceptable crop growth, development and yield components (Bensellam *et al.,* 1995). Westerdijk *et al* (1996) demonstrated weed control by harrowing at 4-leaf stage gave good control and allowed 1-2 low-dose herbicide sprays to be omitted. Meanwhile harrowing reduced weed in sugar beet fields by up to 48.3% (1 harrowing) and 60.1 (2 harrowing) if compared with untreated control Bondarchuk, (1998).

Awad *et al* (2004) reclaimed that the mechanical planting of sugar beet is very necessary to increase the number of plants to 38267 plant/fed and increase root and sugar yield per area unit if compared with manual planting which recorded the lowest values of plants number of 21457 plants per feddan. Also, plowing depth of 35 cm and three times hoeing significantly increase sucrose percentage and root yield than other plowing depth or hoeing times.

This study aimed to compare the different planter types with manual sowing in the shade of the increment of manual workers fees, also to discuss the priority in weed control under different type of hoeing methods.

MATERIALS AND METHODS

This experiment was carried out in two successive seasons (2007-2008 and 2008-2009) in Sakh research station at Kafr El-Sheikh Governorate. Multigerm seeds of sugar beet (*Beta vulgaris*, L.) variety viz "Pleno" imported from Holand were used.

This study included fifteen treatments which were the combination between four planter machines in addition to traditional planting method (manual) as a control and three weed control methods i.e. manual hoeing, mechanical hoeing in addition to hoeing + post emergence herbicide (metamitron with a traditional name Goltix). Goltix was used at the recommended dose (2kg /fad.) at the appearance of 2-4 true leaves. Concerning hoeing procedures the normal three hoeing practices were done at the manual hoeing. On the other hand no hoeing practices were done with mechanical hoeing. Moreover one hoeing practice was done with goltix (70 days after sown)

The technical data and characteristics for the planter machines are shown in Table (1). The characteristics of the used mounted planter were (4 rows X 50 cm between rows) with a 37.5 kW (50-hp) Nasr tractor. The experimental area was ploughed twice, leveled and divided into ridged and plots. Each plot area was 15.5m^2 including 5 ridges, 7m in length and 0.5 m in width. The normal procedures of

agronomic practices were done as usual in sugar beet fields. The recommended doses of phosphorus and potassium fertilizers (15 kg P_2O_5 and 48 kg K_2O/fad.) were added. Nitrogen fertilizer was added as urea (46% N) in two equal doses, i.e. after thinning (45 days after sowing) and three weeks later. Potassium fertilizer (48 kg K_2O/fad.) was added as potassium sulfate (48% K_2O/fed.) with the 1st dose of nitrogen. However, phosphorus was applied as super phosphate (15% P_2O_5) at seed bed preparation. Some vegetative characteristics i.e. root length, diameter, volume and percentage of emergence was determined. Impurities percentages (Na %, K % and α-amino nitrogen), TSS %, sucrose %, root yield (ton/fed.), top yield (ton /fed.) and sugar yield (ton/fed.) were determine. Root volume was determined by water displacement.

Sugar yield ton/fed was calculated according to the following equation:

Sugar yield (ton/fed) = sucrose % X root yield (ton/fed).

A split plot design in four replications was used. The main plot was devoted to planter machines treatments Machines's stroke was 50 meters long (42 meters for each two replicates and eight meters as a border around the experimental area, Meanwhile, the three weed control practices were randomly distributed in the sub plot.

Table 1 . technical data and characteristics of four planters

Characteristics	M1	M2	M3	M4
Type	Push	Push	Abd-Tawwab	Gaspardo
Source of manufacture	Germany	Locally	Locally	Italy
No. of rows	1	2	4	4
Row spacing (mm)	-	50-80	50-80	50-80
Working width (mm)	-	1.65	2.75	2000-3200
E weight (Kg)	25	45	710	600
Metering device	Inclined	Inclined	Vertical	Vertical

RESULTS AND DISCUSSION

1- Growth criteria:

a- Root dimensions and volume as affected by mechanical sowing and different weed control

Results given in Table (2) obviously show that using locally planter (M3) as well as mechanical hoeing proved statistical superiority over the other studied planting machines and hoeing treatments with respect to their influence on root dimensions(i.e. root length and root diameter) as well as root volume. This result was

true at both studied seasons. Concerning 1st season, the highest root criteria i.e. length , diameter and volume recorded 23.4 cm, 10.5 cm and 381.6 cm^3, respectively corresponding 22.1 cm, 10.1 cm and 328.7 cm^3, respectively in the 2nd season by using locally planter (M3) followed by Italy machine (M4). The superiority of these characteristics as a results to mechanical sowing over manual sowing /and or even over the other planter may be due to that the planter of four rows gave better homogeneity in plant population which in turn reflected on root characteristics.

Table 2 . Root dimensions and volume as affected by mechanical sowing and different weed control

Treatments	Root length (cm)											
	1st season (2007/2008)						2nd season (2008/2009)					
	Hand	M1	M2	M3	M4	Mean	Hand	M1	M2	M3	M4	Mean
Manual hoeing	17.5	21.4	21.8	21.4	22.1	21.0	17.2	21.4	21.6	21.7	21.4	20.6
Mechanical hoeing	18.1	21.8	22.1	24.3	23.8	22.0	17.9	21.6	21.8	22.4	21.9	21.1
Goltix+hoeing	18.0	21.7	21.9	23.5	23.3	21.6	17.7	21.5	21.7	22.2	21.4	20.9
Mean	17.9	21.67	21.9	23.43	23.0		17.62	21.5	21.7	22.1	21.6	
LSD 0.05												
A (Mechanic)			0.13							0.11		
B (Hoeing)			0.10							0.06		
AXB			0.24							NS		
	Root diameter (cm)											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	8.46	9.7	9.88	10.3	10.2	9.72	8.30	9.60	9.60	10.1	9.93	9.50
Mechanical hoeing	9.1	10.0	10.1	10.7	10.3	10.0	8.60	9.83	9.63	10.2	10.0	9.68
Goltix+hoeing	8.66	9.13	10.03	10.5	10.23	9.87	8.4	9.73	9.71	10.1	9.73	9.55
Mean	8.70	9.90	10.0	10.5	10.2		8.44	9.72	9.65	10.1	9.91	
LSD 0.05												
A (Mechanic)			0.10							0.18		
B (Hoeing)			0.12							0.11		
AXB			NS							NS		
	Root volume (cm^3)											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	241.6	287	302	352.3	322.3	301.0	236.6	265.6	281.6	304	280	273.6
Mechanical hoeing	280	315.3	347.6	423	360	345.2	260	293.3	311.6	347	333.3	308.8
Goltix+hoeing	258.3	295	311.3	369.6	314.6	309.8	250	282.3	300	335.3	309.3	295.4
Mean	260.0	299.1	320.3	381.6	331.2		248.8	280.1	297.7	328.7	307.5	
LSD 0.05												
A (Mechanic)			8.98							4.85		
B (Hoeing)			9.07							10.2		
AXB			NS							NS		

Once more, the available data distinctly show that mechanical weed control scored the highest values of root growth criteria. The recorded data were 22.0 cm, 10.0 cm

and 345.2 cm^3 at 1st season, corresponding to 21.1 cm, 9.68 cm and 308.8 cm^3 in the 2nd for root length, root diameter and root volume successively. (Awad 2004)

As for the interaction between sowing method and weed control, the results obtained cleared that the differences between the various combinations did not reach the level of significance at both seasons for all the studied criteria, except root length at the 1st season, the 1st order interaction revealed that root length significantly affected by the combination between the studied factors. The collected figures pointed out that under mechanical hoeing local machine (M3) recorded the highest value of root length, whereas, under the same hoeing treatment sowing beet by labors stained the lowest value of this trait.

2-Juice quality and chemical constituents

2.1- Juice quality

Total Soluble Solids (TSS), Sucrose percentage and Quality percentage.

Total soluble solids was affected by the studied factors as shown in Table (3).The manual sowing significantly recorded the lowest value of TSS % at the 1st season, however , the difference between sowing method did not reach the level of significance at the 2nd season. Sowing by using locally planter (M3) surpassed the other planters in this respect. Mechanic hoeing gave the lowest significant TSS % compared to manual hoeing and / or goltix + hoeing treatments which significantly over passed this treatment. The interaction was significant at the two seasons. Planting sugar beet by using planter type M1 with manual hoeing statistically increased TSS % values with no significant difference with weed control of Goltix + hoeing with planter type M3 or M2 in the 1st season, however, in the 2nd season, weed control of Goltix + hoeing treatment with planter type M2 and M1 significantly overpassed planter type M1 with manual hoeing treatment with respectto TSS % values. Meanwhile sucrose percentage which is an important parameter showed different trend. As for the planting method planter type 3 (M3) recorded the highest significant effect on sucrose values 16.8 and 16.7 %, respectively compared to the other planting method. This result was true at both seasons. However, it is obviously clear that using Goltix + hoeing statistically surpassed the other treatments and recorded 16..3 at 1st season. On the other hand at the 2nd season the mechanic hoeing gave the highest significant sucrose value 16..3%. The interaction effect between the studied factors significantly affected on TSS % in both seasons. Sowing beet by labors manually with goltix + hoeing weed control treatment attained a superior value of this trait , meanwhile, the same sowing treatment with mechanical

hoeing recorded the lowest value of TSS %. Also ,it could be noted that weed control treatment by chemical treatment + hoeing gave the highest value of this trait with machine type M2 and / or M3 in the 1st season , however, in the 2nd season sowing and hoeing manually produced better TSS % compared with the mechanical hoeing with the same sowing method. Moreover, hoeing manually and / or controlled weeds by the various machines surpassed mechanical weed control under the various planters.

Concerning sucrose % , the results given in Table (3) and Fig (3)cleared that sowing sugar beet seed using planter type 3 recorded the highest statistical values of sucrose % in both seasons ,it is clearly show too that all the examined planters over passed the manuals sowing in this respect. Increasing the values of sucrose % with planter than that with the manual sowing may be due to the appropriate or the fixed distance between hills which reflected on root size consequently sucrose % compared with the disturbance distances under the manual sowing. Mechanical and/or chemical weed control + hoeing surpassed manual hoeing in respect to their influence on sucrose %.This results was true in the two growing season.

Belonging to the quality percentage obtained results at the two successive seasons appeared that using different planter types compared to the traditional sowing (manually) had no significant effect on this trait. On the contrary, hoeing methods showed significant results on this trait where mechanical hoeing had a superior influence quality, the highest values of quality were 80.95 and 82.59 % forat both seasons, respectively. As for the interaction manual sowing and mechanic hoeing recorded the highest significant value at 1st season which was 84.3%. At the 2nd season mechanical hoeing + either manual sowing and/or machinical type M1 and/or M2 recorded the highest significant values for this trait i.e. 84.16, 84.46 and 83.83% respectively over planter type 3 (M3) and Italian planter type 4(M4). Meanwhile the difference between them did not reach the level of significance.

Table 3. Root juice quality as affected by mechanical sowing and different weed control

Treatments	TSS %											
	1st season (2007/2008)						2nd season (2008/2009)					
	Hand	M1	M2	M3	M4	Mean	Hand	M1	M2	M3	M4	mean
Manual hoeing	20.10	23.80	21.7	22.90	22.40	22.18	22.80	22.10	23.83	21.46	20.73	22.18
Mechanical hoeing	18.96	20.66	20.23	21.40	21.33	20.52	19.23	18.73	19.40	21.26	20.50	19.84
Goltix+hoeing	23.90	21.36	23.43	23.76	20.93	22.68	22.20	23.60	23.73	22.16	21.63	22.66
Mean	20.98	21.94	21.78	22.68	21.55		21.41	21.47	22.32	21.65	20.97	
LSD 0.05												
A (Mechanic)			0.16						NS			
B (Hoeing)			0.20						0.22			
AXB			0.45						0.50			
	Sucrose %											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	15.5	15.5	16	16.1	16.0	15.8	16.3	15.9	16.0	16.5	16.2	15.6
Mechanical hoeing	16.0	16.4	16.5	17.2	16.9	16.0	15.4	15.5	15.7	15.9	15.7	16.3
Goltix+hoeing	15.8	16.2	16.3	17.1	16.3	16.3	15.7	16.2	16.3	17.0	16.5	16.2
Mean	15.7	16.0	16.2	16.8	16.4		15.6	16.0	16.1	16.7	16.4	
LSD 0.05												
A (Mechanic)			0.15						0.05			
B (Hoeing)			0.09						0.04			
AXB			0.20						0.09			
	Quality %											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	77.03	66.10	73.93	70.43	71.50	71.80	69.86	68.30	65.83	74.40	76.00	70.88
Mechanical hoeing	84.30	79.43	81.46	80.33	79.23	80.95	84.16	84.46	83.83	80.13	80.36	82.59
Goltix+hoeing	66.13	76.70	72.90	71.56	77.86	73.0	69.23	75.23	68.16	75.60	76.06	72.86
Mean	75.00	74.00	76.10	74.10	76.20		74.42	76.00	72.16	76.71	77.48	
LSD 0.05												
A (Mechanic)			Ns						Ns			
B (Hoeing)			0.72						0.76			
AXB			0.16						1.7			

2.2- Chemical constituents (impurities)

Sodium (Na), Potassium (K) and α-amino nitrogen percentages.

Table (4) shows the influence of sowing and hoeing methods on impurities percentages of sugar beet roots. Sodium percentage was not affected by the different sowing methods under study at both seasons, this result is presented in Table (4). However using mechanic in hoeing gave the least value for sodium % i.e. 2.73 and 2.49 % at both seasons, respectively. Meanwhile the interaction was significant at both seasons. Locally planter type M2 and mechanical hoeing reduced the sodium % in a significant manner at 1st season and recorded 2.42%, while at the 2nd season the manual sowing and mechanical hoeing had the same effect on this trait and gave the lowest significant value 1.92 %.

The same trend was observed with the effect of the studied treatments on potassium percentage. There was no significant effect recorded by using different planter types compared with manual sowing on this trait. On the contrary, mechanical hoeing significantly reduced potassium percentage. As for the interaction effect of studied treatments on K %, it was statistically affected at the 1st season, manual sowing in combination with mechanical hoeing gave the lowest value (4.43 %). Different result was obtained at 2nd season where locally planter type M3 and Italian planter type 4(M4) in combination with mechanical hoeing gave a significant increment in potassium percentage -which is considered unprofitable at sugar extraction.

Table 4 . Root chemical constituents as affected by mechanical sowing and different weed control

Treatments	Potassium %											
	1st season (2007/2008)						2nd season (2008/2009)					
	Hand	M1	M2	M3	M4	Mean	Hand	M1	M2	M3	M4	Mean
Manual hoeing	6.46	6.77	6.53	5.86	6.54	6.43	6.94	6.87	6.84	6.41	6.40	6.69
Mechanical hoeing	4.43	5.86	5.49	5.36	5.77	5.38	4.77	4.75	4.67	5.57	5.75	5.10
Goltix+hoeing	6.89	6.71	6.48	6.66	6.01	6.55	6.79	6.58	6.07	6.35	6.53	6.46
Mean	5.93	6.45	6.16	5.96	6.11		6.16	6.07	5.86	6.11	6.22	
LSD 0.05												
A (Mechanic)			NS						NS			
B (Hoeing)			0.13						0.11			
AXB			0.29						0.24			
	Sodium %											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	3.57	4.69	3.97	4.49	4.72	4.29	4.20	4.26	5.03	3.82	3.59	4.18
Mechanical hoeing	2.54	2.88	2.42	2.84	2.99	2.73	1.92	2.68	2.25	2.97	2.62	2.49
Goltix+hoeing	5.24	3.86	4.76	4.60	3.29	4.35	5.16	4.35	4.67	3.69	3.07	4.19
Mean	3.78	3.81	3.72	3.98	3.67		3.76	3.76	3.99	3.49	3.09	
LSD 0.05												
A (Mechanic)			NS						NS			
B (Hoeing)			0.10						0.17			
AXB			0.24						0.39			
	α-amino nitrogen %											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	0.94	4.22	1.49	3.96	2.64	2.65	4.67	2.48	4.54	2.55	1.24	3.09
Mechanical hoeing	1.80	1.25	1.38	1.17	1.66	1.45	2.85	1.73	1.74	1.16	1.33	1.76
Goltix+hoeing	4.07	1.19	4.44	3.47	1.73	2.98	4.29	2.58	4.60	1.39	1.76	2.92
Mean	2.27	2.22	2.44	2.87	2.01		3.93	2.26	3.62	1.70	1.44	
LSD 0.05												
A (Mechanic)			NS						0.32			
B (Hoeing)			0.21						0.23			
AXB			0.48						NS			

α-amino nitrogen is one of the very important chemical substances which directly and negatively affected on sugar extraction . Data obtained cleared that there is no significant effect on α-amino nitrogen due to sowing methods at the 1st season, however at the 2nd season, this effect was statistically, using Italian planter type M4 recorded the least significant value 1.44% compared with the other studied treatments. Weed control applied methods significantly affected this trait at both seasons. Using mechanical hoeing statistically surpassed the other methods where it recorded 1.45 and 1.76 %, respectively. The interaction was significant only at the 1st season. Regardless the significance of the interaction between the studied factor ,it could be deduced that the most effective treatment on α-amino nitrogen was that the combination between mechanical weed control with mechanical sowing by using planter type M3.

Yield and yield components:

1-Root number/fed.

Results obtained in Table (5) discus the relative importance of mechanical sowing on the plant population at harvest , based upon there is a direct effect between the emerged seedlings and sowing efficiency methods consequently the final number of plant density at harvest.

Results given in Table (5) cleared that sowing sugar beet by using any of the tested planter attained a pronounced increase in the number of roots at harvest. This finding was fairly true at the two growing seasons. However, the differences between the examined planters were not enough to reach the level of significance in both seasons. The effective role of sowing machines my be attributed by its sowing arrangement compared with the manual sowing. (Awad 2004)

Table 5. Effect of sowing methods on roots number /Fed.

Planter type	Number of plants/fad.	
	1st season 2007-2008	2nd season 2008-2009
Manual sowing	25848.2	26225.3
Germany M1	31967.4	31087.7
Locally M2	32465.1	32611.7
Locally M3	32694.1	32243.5
Italian M4	32639.5	32144.0
LSD at 0.05	777.9	601.8

2-Root yield (Tons/Fed.):

Results given in Table (6) revealed that root yield of sugar beet crop significantly affected by sowing methods in the 1st season Using planter type M3 surpassed the planters type M1 andM2as well as recorded highly superiority over the manual sowing method which produced the lowest value of root yield . Also, it could be noted that the difference between planter types M3 and M4 was not significant in this respect. The superiority of sowing mechanical mainly due to the fruitful influence on the final number of roots at harvest which in turn reflected on root yield.

Concerning of hoeing treatments on root yield , the available data revealed that mechanical hoeing gave higher yield than the other treatments in the 1st season, however, this effect was negligible in the 2nd season . the interaction between the studied factors appeared a significant influence on root yield/Tons/fed. Sowing beet by using planter type M3 with the mechanical hoeing produced the highest root yield.

Results given in Table (6) showed that sowing sugar beet seed by using the planter type M3 attained additional increment in top yield over the other machines and 39.8 % and 35.66 % over the manual sowing in the 1st and 2nd season respectively. Once more, the available data in the same Table pointed out that hoeing sugar beet crop mechanically attained the highest top yield/fed. This finding was true in both growing season. The results showed that top yield insignificantly affected by the interaction between sowing method and hoeing treatment.

Table 6 . Yield component as affected by mechanical sowing and different weed control

Treatments	Root yield (ton/fad.)											
	1st season (2007/2008)						2nd season (2008/2009)					
	Hand	M1	M2	M3	M4	Mean	Hand	M1	M2	M3	M4	mean
Manual hoeing	24.5	27.3	27.8	30.1	29.1	27.8	24.8	26.2	26.9	29.5	28.7	27.2
Mechanical hoeing	26.3	28.9	29.0	32.4	31.1	29.5	26.0	27.9	28.7	21.9	29.7	26.7
Goltix+hoeing	26.1	28.2	28.4	31.1	30.2	28.8	25.8	27.4	27.3	29.9	29.1	27.9
Mean	25.6	28.1	28.4	31.2	30.1		25.5	27.2	27.6	26.9	29.1	
LSD 0.05												
A (Mechanic)			1.98							NS		
B (Hoeing)			0.11							NS		
AXB			0.24							NS		
	Top yield (ton/fad.)											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	9.63	12.8	13.1	13.7	13.2	12.5	9.5	12.4	12.6	13.1	12.9	12.1
Mechanical hoeing	10.0	13.2	13.5	13.9	13.8	12.9	9.9	12.7	13.1	13.3	13.1	12.4
Goltix+hoeing	9.91	12.9	13.0	13.7	13.4	12.6	9.7	12.5	12.9	13.2	121.9	12.3
Mean	9.87	13.0	13.2	13.8	13.5		9.73	12.5	12.8	13.2	13.0	
LSD 0.05												
A (Mechanic)			0.17							0.15		
B (Hoeing)			0.12							0.08		
AXB			NS							NS		
	Theoretical sugar yield (ton/fad.)											
	1st season (2007/2008)						2nd season (2008/2009)					
Manual hoeing	3.78	4.30	4.46	4.91	4.66	4.42	3.78	4.08	4.23	4.57	4.54	4.24
Mechanical hoeing	4.18	4.75	4.78	5.59	5.26	4.91	4.11	4.54	4.68	5.27	4.92	4.70
Goltix+hoeing	4.10	4.59	4.64	5.30	4.94	4.71	4.05	4.40	4.42	5.03	4.81	4.54
Mean	4.02	4.55	4.63	5.27	4.96		3.98	4.34	4.44	4.96	4.75	
LSD 0.05												
A (Mechanic)			0.57						0.80			
B (Hoeing)			0.23						0.48			
AXB			0.57						1.07			

Results shown in Table (6) cleared that sugar yield/fed. statistically raised under mechanical sowing compared with manual sowing , sowing beet by using planter type M3 surpassed the manual sowing by 40.98 % and 24.62 % . Also, it is clearly showed that hoeing sugar beet mechanically increased significantly sugar yield/fed. The relative advantage in sugar yield whether by sowing or hoeing mechanically mainly attributed with their influence on root yield and sucrose percentage. Sowing sugar beet seeds by using planter type M3 and hoeing it mechanically gave the highest value of sugar yield.

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ميكنة البذر والعزيق وعلاقة ذلك بالتركيب الكيماوى والمحصول ومكوناته لبنجر السكر

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معهد بحوث المحاصيل السكرية – مركز البحوث الزراعية – الجيزة

اقيمت تجربة حقلية لموسمين متتاليين فى ٢٠٠٧/٢٠٠٨ ، ٢٠٠٨/٢٠٠٩ بمحطة بحوث سخا – محافظة كفر الشيخ لدراسة استجابة بنجر السكر للعزيق الآلى والبذر الآلى . اشتملت التجربة على خمسة عشر معاملة هى التوافق بين (اربعة مكينات للبذرالآلى بالإضافة إلى الزراعة العادية) وثلاث معاملات للعزيق (العزيق اليدوى ثلاث مرات ، العزيق الميكانيكى فقط وعزقة واحدة بالأضافة إلى الرش بمبيد الجولتكس). استخدم تصميم القطع المنشقة فى تنفيذ معاملات التجربة ، حيث شغل البذر الآلى القطع الرئيسية بينما وزّعت معاملات العزيق فى القطع الشقية.

أشارت النتائج المتحصل عليها إلى زيادة معنوية لتأثير البذر الآلى عن الزراعة اليدوية على كل من محصول العرش ، الجذور والسكر بالفدان وقد حققت الآلة M3 تفوقاً ملحوظاً فى هذا الشأن ، وأيضاً تأثر معنوياً كل من قطر وطول وحجم الجذور بالبذر الآلى

أظهرت النتائج أن نسبة الشوائب (الصوديوم والبوتاسيوم والألفا- أمينو نيتروجين) وكذلك صفات الجودة لم تتأثر بالبذر الميكانيكى مقارنة بالبذر اليدوى ، بينما قلت نسبة المواد الصلبة الذائبة الكلية معنوياً بالبذر الآلى ، في حين إزدادت النسبة المئوية للسكروز معنوياً باستخدام آلة البذر M3 .

وفيما يتعلق بتأثير معاملات العزيق فقد دلت نتائج الدراسة على أن العزيق الميكانيكى قد فاق معنوياً العزيق اليدوى ومعاملة "عزقة واحدة + الرش بمركب الجولتكس" وذلك فيما يختص بجميع صفات النمو والتركيب الكيماوى ومكونات المحصول.