Minufiya J. Agric. Res. Vol.35 No. 6: 2063-2075 (2010) "http://www.mujar.net"

EFFECT OF SOIL LEVELING TECHNIQUES AND SOWING METHODS UNDER DIFFERENT PLOWING DEPTHS ON SUGAR BEET YIELD AND QUALITY IN NUBARIYA REGION

K. M. Agami[1]; M. M. Abd- El Rahman [2] and H. M. Aboul-Nour[3]

1- Department of Agricultural Practices. Sugar Crops Research Institute, Agricultural Research Center (ARC), Giza, Egypt

2- Department of Agricultural Physiology and Chemistry. Sugar Crops Research Institute, Agricultural Research Center (ARC), Giza, Egypt

3- Agricultural Engineering Research Institute, Agricultural Research Center (ARC), Giza, Egypt

(Received: Oct. 17, 2010)

ABSTRACT: *Two field experiments were conducted during both seasons of 2007/ 2008 and 2008/ 2009 over two locations at km 71 West Alexandria-Cairo desert Road in commercial field of sugar beet grower farmer in Nubariya region. This investigation was conducted to study the effect of land leveling technique, sowing method and plowing depth on the yield and quality of sugar beet. The first location was soil leveled by laser method (L_1), and the second location was soil leveled traditionally (L_2). Each trial for single location included six treatments representing the combinations among three sowing methods and three plowing depths. The use of laser leveling before sowing sugar beet achieved the highest values of the measured characters i.e., root length and diameter (cm), fresh weight of root and leaves (g/ plant), root, top and sugar yield (Mg/ fed), total soluble solids (T.S.S) and sucrose percentages, while there was no different significant between the two methods of land leveling on number of root/ fed and purity percentage. Mechanical sowing by using the planter attained the superior values of root length (cm), fresh weight of leaves (g/ plant), number of roots/ fed, root, top and sugar yield (Mg/ fed), total soluble solids (T.S.S) and sucrose percentages compared with both the traditional methods (rows and terraces), while the highest values of root diameter and fresh weight of root/ plant were obtained with traditional sowing on terraces. Plowing depth of 40 cm resulted in highest values of root length and diameter (cm), fresh weight of root and leaves (g/ plant), root, top and sugar yield (Mg/ fed), total soluble solids (T.S.S) and sucrose percentages. It could be concluded that, the use of mechanization in agricultural operations such as laser leveling, deep plowing of 40 cm and the use of planter in the cultivation of sugar beet was the best combination to maximize sugar beet productivity in the newly reclaimed sandy soils under the environmental conditions of the present study.*

Key Words: *Sugar beet yield – Soil leveling – Laser – Plowing depth- Sowing methods –Technological quality – Nubariya - Planter*

INTRODUCTION

Sugar beet (*Beta vulgaris* L.) is the second important sugar crop after sugar cane. It is a vital crop as a source of high energy and an important source of feed for livestock. About 45 percentage of sugar in the world is produced from sugar beet.

Recently, sugar beet has become an important source for sugar production in Egypt, because of the shortage in sugar produced which does not meet the consumption of the increasing population. Sugar beet is a winter crop that requires less amount of water than sugar cane and tolerates soil salinity. Therefore, it could be successfully grown in newly reclaimed areas.

Improvement of sugar beet production can be achieved through optimizing the cultural practices such as mechanical management, land leveling by laser, deep plowing and sowing sugar beet by using planter machine.

Land leveling is one of the main practiced operations before sugar beet sowing, sugar beet is very sensitive for irrigation water therefore, it is essential to leveling soil especially by laser. El- Sahrigi *et al* (2001) noticed that, the water requirement of barley crop was decreased by 22% by using laser land leveling technique as a compared with traditional land leveling method. El- Haddad (1992) reported that, laser leveling increases crop production by not less than 20%. Tayel *et al* (1988) reported that, the laser leveled soil produced a more uniform root than the traditional leveled soil; the roots had a bigger diameter in the laser leveled soil, due to adjust water supply for plants.

Taieb (1997) reported that, the mechanical sowing of sugar beet saved about 33 % of seeds compared with the hand sowing. The mechanical sowing of sugar beet decreased the cost of the consumed energy by about 58%. The mean yield values were 29.22 and 34.38 Mg/ fed with hand and mechanical sowing, respectively. Mady (1997) reported that, the mechanical sowing led to increase the root yield by about 5.76% as compared with the traditional sowing. Awad (2000) found that, maximum sugar percentage was 20.33%, highest value of root weight was 1.60 kg/ plant, consequently it gave the highest root yield (43.677 Mg/ fed.). Also the maximum sugar yield was (8.386 Mg/ fed.) for two rows machines sowing. El-Geddawy *et al* (2008) reported that, sowing sugar beet mechanically tended to increase the values of sugar beet root yield and attained additional increment in root yield over those under the traditional method (sowing manually) amounted by 8.52 % and 25.08 % in the 1st and 2nd seasons, respectively. The collected data appeared that there is general tendency toward increasing the sugar yield/ fed. by using planter technique for sowing sugar seeds.

Plowing depth is considered as the major process in seedbed preparation, and the plowing may be offer so many observable advantages such as creating suitable conditions for seed germination and root growth,

maintaining and improving the soil fertility, accumulating soil moisture, destroying weeds, aerating the soil and creating a favorable condition for activity of useful bacteria Khalifa *et al* (2000).

The objective of this study was to compare between leveling method and plowing depth on sugar beet yield and quality. In addition to study the suitable sowing method through applying three sowing methods which are mechanical- traditional (rows) - and traditional (terraces).

MATERIALS AND METHODS

Two field experiments were conducted during both seasons of 2007/2008 and 2008/2009 over two locations at km 71 West Alexandria-Cairo desert Road in commercial field of sugar beet grower farmer in Nubariya region. This investigation was conducted to study the effect of land leveling methods, sowing methods and plowing depths on yield and quality of sugar beet. The soil in first location was leveled by laser method (L_1), and the second location was leveled traditionally (L_2). Each trial for every location included six treatments representing the combinations among three sowing methods and three plowing depths.

Soil samples were randomly taken pre- sowing form the experimental site at a depth of 0 to 30 cm from soil surface and prepared for both physical and chemical analysis according to Ankerman and Large (1974). The sites of the two experiments were in the same locality that has a sandy soil contained averagely distinctly low amount of organic matter (0.25 %), and characterized by relatively low soluble cations (Ca^{2+}, Mg^{2+}, Na^{+}, and K^{+} with values of 2.56, 1.88, 4.55 and 0.78 meq L^{-1}, respectively) and anion (CO_3^{-2}, HCO_3^{-}, CL^{-} and SO_4^{-2} with values of 0.01, 1.71, 7.09 and 1.15 meq L^{-1}, respectively). The soil had electrical conductivity of 0.94 ds/ m, and pH of 8.05. Also, it had 9.74 % $CaCO_3$, and relatively low N, P and K with values of 32.09, 3.13 and had 79.50 ppm, respectively.

A- Plowing depth

Three levels of plowing depth were conducted (P_1= 30 cm, P_2= 40 cm and P_3= 50 cm). The used plow was chisel plow with Standards number of 7 blades arranged on two rows, the first one with 3 blades and the second with 4 blades, spacing between blades 45 cm, the plow gullet measured 75 cm, plowing depth is changeable controlled by the two wheels of depth adjusting (Gauge wheels), maximum depth reaches 55 cm, the used tractor was Fiat® 4×4 wheel drive with capacity of 160 h.p.

B- Sowing method

Three methods of sowing were carried out as follows:

1- Mechanical sowing (S_1) by using Italian planter consists of 4- drilling units work under vacuum, rpm 540, tractor's speed 6 km/ h (sowing time 40- 45 min/ fed.). After well done of plowing the soil, smoothing and flatting it, the planter sowed and made rows in one step, the planter

sowed seeds on the distances of 15 cm between hills, with rows width of 60 cm.

2- Manual sowing by labours on one side of ridges of 50 cm width and 15 cm between hills (S_2).
3- Manual sowing by labours on two sides of terraces of 100 cm width and 15 cm between hills (S_3).

A split plot design with three replications was used, where plowing depths were allocated in the main plot, the sowing methods were distributed in the sub plot. The sub plot area was 140 m^2 (1/30 fed), with 28 m in length and 5 m width i.e. ten ridges and 5 terraces. Sowing date was at 15th October in both seasons and the harvest was after 210 days from sowing.

The experimental fields were prepared through plowing, and calcium super phosphate (15.5% P_2O_5) was applied during tillage operation at a rate of 100 kg/fed. Potassium sulfate (48% K_2O) was applied at a rate of 50 kg/ fed (24 Kg K_2O/ fed) after thinning. Concerning nitrogen fertilization was applied in a form of ammonium nitrate (33.5 % nitrogen) at a rate of 80 kg/ fed. in two equal doses, the 1st one was added after thinning and the ^{2nd} was added one month later. Sugar beet cultivars, polygerm (Gloria) was obtained from Sugar Crops Research Institute, Agricultural Research Center.

Plants were thinned to one plant at four true leaves stage in both seasons. Irrigation of sugar beet plant was done as needed. The cultural practices were applied as recommended by the Ministry of Agriculture and Land Reclamation for Nubariya region.

Data recorded

I- Growth attributes

Plant samples (5 plants) were taken arbitrary after 210 days from sowing, for each replication (15 plants per treatment), to study the following characters of growth parameters: 1- average root length (cm); 2- average root diameter (cm); 3- average fresh weight of root (g/ plant) and 4- average fresh weight of leaves (g/ plant).

II- Yield and yield components

At harvest the sample was taking from the median guarded rows and terraces of each plot then topped, cleaned and the following characters were recorded: 1- average number of roots per feddan (number/ fed.); 2- average root yield (Mg/ fed.); 3- average top yield (Mg/fed.) and 4- sugar yield (Mg/ fed.), whereas, sugar yield was calculated according to the following equation:

Sugar yield = Root yield (Mg/fed.) x Sucrose %

III- Technological quality

The following measured parameters were recorded and used to compare between treatments: 1- total soluble solids percentage (T.S.S %) was determined with a hand reflectometer; 2- sucrose percentage was determined

according to the method described by Le- Docote (1927), by using Digital Automatic Polarimeter and 3- Juice purity percentage was determined according to the method described by Carruthers and Field (1961) using the following equation:

$$\text{Juice purity percentage} = \frac{\text{Sucrose percentage} \times 100}{\text{T. S. S}}$$

Statistical Analysis

The obtained data were subjected to the appropriate statistical analysis according to procedure out lined by Sendecor and Cochran (1980). Combined analysis between two locations and two seasons were deduced according to Mc Intosh, M. S. (1983). The significant difference (L.S.D) (Waller and Duncan, 1969) at 5% level of significant was don to compare between means.

RESULTS AND DISCUSSINS

I- Growth attributes

The present data in Table (1) show the average values of root length and diameter (cm), fresh weight of root and leaves (g/ plant) after 210 days from sowing, as affected by different land leveling, sowing methods under three plowing depths during two growing seasons 2007/ 2008 and 2008/ 2009.

1- Land leveling method

Results presented in Table (1) indicate that the use of laser leveling before sowing sugar beet achieved the highest values of the measured growth attributes i.e., root length and diameter (cm), fresh weight of root and leaves (g/ plant) were 34.88, 13.36 cm and 733.40, 661.69 g/ plant respectively,. The rates of increase were (6.8%, 1.3% and 5.5%, 1.6% respectively,) compared with the traditional land leveling. The highest increase value observed with laser leveling for both fresh weight of roots and leaves.

These results are in harmony with those reported by Hassan (2007) who found that the use of laser leveled soil resulted in increases for root perimeter. Also, El- Maghraby *et al* (2008) reported that laser leveling gave a significant increase in root length and root perimeter.

2- Plowing depths

The results in Table (1) show that the highest root length, diameter, fresh weight of root and leaves (34.31 and 12.85 cm, 740.31 and 637.81 g/ plant, respectively) were achieved with plowing depth of 40 cm. While the lowest (32.81 and 12.22 cm, 679.10 and 582.57 g/ plant, respectively) were obtained with plowing depth of 30 cm. There was no significant difference between the two examined depths (40 and 50 cm).

The obtained results were in the same trend with those recorded by Awad (2000) and Cavalaris C.K. (2002) who stated that increasing depth of

cultivation to 40 cm in sugar beet soil enhance the physical condition of the uncultivated profile and makes it favorable for root growth. Also, Agami (2005) reported that increasing plowing depth creates the suitable condition for root growth. Hassan (2007) found that the highest values of root length and diameter were obtained by deep plowing.

It could be concluded that, plowing depth is the major considerable factor in seedbed preparation to create suitable conditions for seed germination and root growth to give the best root buildup.

Table (1): Effect of land leveling, plowing depth and sowing method on growth attributes of sugar beet by combined analysis for the two techniques of land leveling and the two seasons of 2007/ 2008 and 2008/ 2009.

Treatment	Root length (cm)	Root diameter (cm)	Fresh weight of roots (g/ plant)	Fresh weight of leaves (g/ plant)
Land leveling				
Laser	34.88	13.02	744.51	652.43
Traditional	32.66	12.03	702.72	578.09
L.S.D	1.02	0.24	18.60	36.65
Plowing depth (cm)				
30	32.81	12.00	701.32	590.90
40	34.31	12.86	737.53	631.53
50	34.19	12.71	732.00	623.35
L.S.D	1.01	0.29	21.88	26.18
Sowing method				
Planter	34.92	11.71	700.29	659.03
Row	34.00	12.81	732.14	613.69
Traces	32.39	13.06	738.42	573.06
L.S.D	0.90	0.24	19.53	24.77

* L.S.D = Least significant difference

3- Sowing methods

The results obtained in Table (1) confirmed that there were significant differences between the three sowing methods of sugar beet. Mechanical sowing by using the planter was attained the superior values of root length and fresh weight of leaves/ plant (34.92 cm and 650.69 g/ plant, respectively). While the highest values of root diameter and fresh weight of root/ plant were obtained with traditional sowing on terraces (13.06 cm and 738.42 g/ plant, respectively).

The relative increase in root length and fresh weight of leaves/ plant under sowing mechanization may be due to the regular occupied sowing area by single plant which consequently made more availability of light and nutrients lead to optimization of photosynthesis.

II- Yield and yield components

The data shown in Table (2) indicate the effect of land leveling techniques, sowing methods and deep plowing during the two seasons of 2007/ 2008 and 2008/ 2009 on yield and yield components.

1- Land leveling method

Data in Table (2) proved that the use of laser leveling technique pre-sowing sugar beet achieved the highest values of root, top and sugar yield (Mg/ fed), (25.803, 11.893 and 4.778 Mg/ fed, respectively). The rate of increasing (8.2%, 23.7% and 14.9%, respectively) compared with traditional land leveling. On the other hand, there was no significant difference between the two methods of land leveling on number of root/ fed.

The present results are in harmony with those obtained by Hassan (2007) who found that laser leveling produces the highest values of root, top and sugar yield (Mg/ fed).

2- Plowing depth

The results in Table (2) show that, the highest value of number of roots/ fed (35315 roots/ fed) was achieved with plowing depth 50 cm, while the lowest value (33424 roots/ fed) was obtained with plowing depth 30 cm. As well as the highest value of root, top and sugar yield (25.646, 11.582 and 4.714 Mg/ fed, respectively) were achieved with plowing depth 40 cm. While, the lowest value (23.215, 9.375 and 4.064 Mg/ fed, respectively) were obtained with plowing depth 30 cm. On the other hand, there was no significant difference between the two depths (40 and 50 cm) on both number of roots per feddan and top and sugar yield.

These results are parallel with those recorded by Khalifa (2000) and Awad *et al* (2004 and 2006) who reported that, the deep plowing for sugar beet soil gave the highest value of root yield (Mg/ fed). Also, Agami (2005) reported that plowing depth of 40 cm resulted in highest values of root, and sugar yield (Mg/ fed).

The increase in root yield/ fed resulted from plowing depth which considered as the major process in seedbed preparation, where created suitable conditions for seed germination and growth. Additionally, these results were expected since plowing depth significantly increased length, diameter and weight of root/ plant.

3- Sowing method

Data in Table (2), also, show clearly that number of roots/ fed, root, top and sugar yield (Mg/ fed) statistically affected by the tested sowing method. Sowing sugar beet mechanically by planter tended to increase the values of

those parameters and attained additional increments in them soaring those under traditional method (rows) amounted by 13.9%, 8.9%, 8.1% and 12.1%, respectively, as well as (terraces) amounted by 32.7%, 25.8%, 25.6% and 32.7%, respectively.

These results are parallel with those recorded by El-Geddawy *et al* (2008) whom reported that the total average of the root number/ fed of the two seasons appeared a relative advantage in this trait over the two hand sowings.

The relative increase in the root number/ fed may be due to the regular sowing distance under sowing mechanization which in turn reflected root number at harvest. As well as, root yield (Mg/ fed) statisticaiiy affected by the studied sowing methods. Sowing sugar beet mechanically tended to increase the values of root yield and attained additional increments in root yield over those under the traditional method (sowing manually) amounted by 8.52 % and 25.08 % in the 1st and 2nd seasons, respectively.

Table (2): Effect of land leveling, plowing depth and sowing method on yield and yield components of sugar beet by combined analysis for the two techniques of land leveling and the two seasons of 2007/ 2008 and 2008/ 2009.

Treatment	No. of roots (number/ fed.)	Root yield (Mg/ fed)	Top yield (Mg/ fed)	Sugar yield (Mg/ fed)
Land leveling				
Laser	34979	25.803	11.893	4.778
Traditicnal	34122	23.842	9.612	4.158
L.S.D	1428	0.873	1.361	0.165
Plowing depth (cm)				
30	33424	23.215	9.375	4.064
40	34911	25.646	11.582	4.714
50	35315	25.605	11.301	4.627
L.S.D	1177	0.710	1.713	0.175
Sowing method				
Planter	39386	27.447	11.855	5.066
Row	34585	25.206	10.965	4.519
Traces	29679	21.813	9.439	3.819
L.S.D	1277	0.827	0.835	0.166

* L.S.D = Least significant difference

III- Technological quality

The data in Table (3) showed that, the effect of land leveling technique, sowing methods and deep plowing during the two seasons of 2007/ 2008 and 2008/ 2009 on total soluble solids (T.S.S), sucrose and purity percentages.

1-Land leveling method

The data presented in Table (3) reveal that the usage of laser leveling pre-sowing sugar beet achieved the highest values of total soluble solids (T.S.S) and sucrose percentages that recorded a significant increase soaring that of traditional land leveling by more than (6.8% and 6.2%, respectively). On the other hand, there was no significant difference between the two methods of land leveling on purity percentage.

These results agree with those obtained by Hassan (2007) who reported that the use of laser leveling technique attained the highest values of total soluble solids (T.S.S) and sucrose percentages.

2- Plowing depth

The data presented in Table (3) reveal that, total soluble solids (T.S.S) and sucrose percentages were significantly increased with increasing plowing depth; there were significant distinction between the three plowing depths. The results order from the highest values of total soluble solids (T.S.S) and sucrose percentages (22.04% and 18.30%, respectively) with the plowing depth of 40 cm. The lowest plowing depth (30 cm) achieved the lowest values of total soluble solids (T.S.S) and sucrose percentages (20.88 and 17.48%, respectively).While, there were no significant differences between the two plowing depths (40 and 50 cm) on these precedent characters. On the other hand, there were no significant differences between the three plowing depths on purity percentage Agami (2005).

3- Sowing method

The collected data in Table (3) revealed that, there were significant differences between the three methods of sowing sugar beet. The mechanical sowing by planter gave the highest significant value of total soluble solids (T.S.S) and sucrose percentages (22.14% and 18.38%, respectively) that recorded a significant increase over other two the traditional methods (rows and terraces) by more than (2.5% and 2.6%, 5.6% and 5.1%, respectively). On the other hand, there was no significant difference between the three methods of sowing on purity percentage.

These results are parallel with those recorded by El-Geddawy *et al* (2008) whom showed that, the mechanical sowing achieved the highest values of total soluble solids (T.S.S) and sucrose percentages.

Table (3): Effect of land leveling, plowing depth and sowing method on technological quality of sugar beet by combined analysis for the two techniques of land leveling and the two seasons of 2007/ 2008 and 2008/ 2009.

Treatment	Total soluble solids percentage %	Sucrose percentage %	Purity percentage %
Land leveling			
Laser	22.28	18.47	0.831
Traditional	20.86	17.39	0.834
L.S.D	0.49	0.26	N.S
Plowing depth (cm)			
30	20.88	17.48	0.838
40	22.04	18.30	0.832
50	21.79	18.02	0.829
L.S.D	0.34	0.41	N.S
Sowing method			
Planter	22.14	18.38	0.831
Row	21.61	17.92	0.830
Traces	20.96	17.49	0.836
L.S.D	0.40	0.36	N.S

* L.S.D = Least significant difference

REFERENCES

Agami, K. M. (2005). Effect of sowing date, plowing depth and nitrogen fertilizer on yield and quality of sugar beet at Noubaria. Ph. D. Thesis, Fac. Of Agric., Moshtohor, Zagazig Univ. Egypt.

Ankerman, D. and L. Large (1974). Soil and plant analysis, ASL. Agricultural laboratories. Inc., New York USA.

Awad, N. M. M. (2000). Effect of mechanical sowing on production of sugar beet yield. Ph. D. thesis, Fac of Agric Kafr El- Sheikh Tanta Univ.

Awad, N. M. M., H.A. El- Khateeb, R. Rbou- Shieshaa, R. Kholief and R. Kuany (2006). Comparative study for the effect of different tillage systems o water consumption and sugar beet yield. Egypt. J. Agric. Res., 84(1): 129-145.

Awad, N. M. M., T. S. EL-Ammari and A. M. EL-Sayed Gomaa (2004). Impact of plowing depth and hoeing on the sugar beet quality and productivity under two different sowing methods. Egypt. J. Agric. Res., 82 (4): 1747-1760.

Carruthers, A. and J. F. T. Old Field (1961). Methods for the assessment of beet quality. Int. Sug. J., 63 (1): 103- 105.

Cavalaris, C.K. and T.A. Gemtos (2002). "Evaluation of Four Conservation Tillage Methods in the Sugar Beet Crop". Agricultural Engineering International: the CIGR Journal of Scientific Research and Development. Manuscript LW 01 008. Vol. IV. June, 2002.

El- Haddad, Z. A. (1992). Agricultural Mechanization in Egypt status and improvement potential. APCP, EEC, Project Princ. Bank for dev. and Agric. Credit.

El- Geddawy I.H., K. A. Kheiralla, Y.Y.I Darweish and E.A.M Sharaf (2008). Agricultural practices in relation to yield and quality of sugar beet: Yield and yield components. Sugar Tech (2008) 10(3): 227-233.

El-Maghraby, Samia M.A.Gomaa, I.F. Rehab and Hala. M. S. Hassan (2008). Response of sugar beet to some mechanical management practices, irrigation and plant densities. Sugar Tech (2008) 10(3): 219-226

El-Sahrigi, A.F., GH. El-Sayed, S.E. Badr, I. Yehia (2001). Effect of some sowing and land leveling systems on barley crop productivity. The 9th Conf. of the Misr Soc. of Agric., Eng 9–11 October, 2001: 133–146.

Hassan, Hala M. S. (2007). Response of sugar beet to some mechanical management practices, irrigation and plant densities. M. Sc. Thesis Fac. Of Agric. Saba Basha, Alex. Univ.

Khalifa, M.R., A. A. Balba, S. A. Mashali and S. A. Morssi (2000). Impact of soil sloughing depth and different rates of NPK fertilizers on some soil properties yield and quality of sugar beet plant grown in salt affected soil. J. Agric. Res., Tanta Univ. 26(1): 108–121.

Le- Docte, A. (1927). Commercial determination of sugar in the beet root using the Sacks Le- Docte process. Int. Sug. Jour., (29): 488- 492. [C. F. Sugar beet Nutrition 1972 Applied Sci. Publishers L td (London A. P. Draycott)]

Mady, M. A. (1997). Mechanization of some operations for sugar beet production. Misr J Ag Eng 18 (2): 339 - 355.

Mc- Intosh, M. S. (1983). Analysis of combined experiments. Agron. J. 75 (1): 153- 155.

Snedecor, G. V. and W. G. Cochran (1980). Statistical Methods. 7th ED., Iowa State Univ. Press, Ames., I[ow]a, USA.

Tayel, S.A; M.F. Wahby and M.F.A. Khairy (1988). Effect of soil preparation on the physical and mechanical properties of sugar beet. Mian. J. Agric. Eng., 5(3): 357

Taieb, A.Z. (1997). Comparative study on manual and mechanical sugar beet sowing in the newly reclaimed lands. Misr J Ag Eng 14 (3): 299-309.

Waller, R. A. and D. B. Duncan (1969). A bays rule for the symmetric multiple comparison problems. Am. Stat. Assoc. Jour. Dec., 1485- 1503.

تأثير طرق التسوية والزراعة تحت أعماق حرث مختلفة على محصول وجودة بنجر السكر فى منطقة النوبارية

كمال محمد عجمي[١] – محمد مصطفى عبد الرحمن[٢] –
حسن محمد أبو النور حسن[٣]

١- قسم بحوث المعاملات الزراعية. معهد بحوث المحاصيل السكرية – مركز البحوث الزراعية – جيزة
٢- قسم بحوث الفسيولوجي و الكيمياء. معهد بحوث المحاصيل السكرية – مركز البحوث الزراعية – جيزة
٣- معهد بحوث الهندسة الزراعية- مركز البحوث الزراعية- جيزة

الملخص العربى

أجريت تجربتان فى موسم ٢٠٠٧/ ٢٠٠٨ و ٢٠٠٨/ ٢٠٠٩ فى موقعين فى الكيلو ٧١ غرب الطريق الصحراوى الاسكندرية- القاهرة فى حقل تجارى عند مزارع بنجر سكر فى منطقة النوبارية وذلك لدراسة تأثير طرق التسوية والزراعة وأعماق الحرث على محصول وجودة بنجر السكر، وقد تم استخدام الليزر فى التسوية فى الموقع الأول بينما استخدمت القصابية العادية فى الموقع الثانى، وتم توزيع ستة معاملات فى كل موقع وهى عبارة عن ثلاثة طرق زراعة (البلانتر- الخطوط- المصاطب) وثلاثة أعماق حرث (٣٠- ٤٠- ٥٠ سم).

وتوصلت الدراسة الى النتائج الآتية:

(١) حققت التسوية بالليزر أعلى القيم لمعظم الصفات تحت الدراسة متمثلة فى طول وقطر الجذر والوزن الغض لكل من الجذر والأوراق/ نبات وكذلك محصول الجذر والعرش والسكر (طن/ فدان) والنسبة المئوية لكل من المواد الصلبة الذائبة الكلية والسكر.

(٢) لم يكن هناك تأثير معنوي على كل من عدد الجذور/ فدان ونسبة نقاوة العصير.

(٣) وجد أن زراعة البنجر باستخدام البلانتر أعطت أعلى قيم لكل من طول الجذر والوزن الغض للأوراق/ نبات و عدد الجذور/ فدان وكذلك محصول الجذر والعرش والسكر (طن/ فدان) والنسبة المئوية لكل من المواد الصلبة الذائبة الكلية والسكر وذلك مقارنة بطريقتى الزراعة الأخرى (الخطوط والمصاطب).

(٤) حققت الزراعة اليدوية على المصاطب أعلى قيمة لكل من قطر الجذر والوزن الغض للجذر/ نبات.

(٥) حقق الحرث على عمق ٤٠ سم أعلى القيم لكل من طول وقطر الجذر والوزن الغض لكل من الجذر والأوراق/ نبات وكذلك محصول الجذر والعرش والسكر (طن/ فدان) والنسبة المئوية لكل من المواد الصلبة الذائبة الكلية والسكر.

وتوصى الدراسة أن استخدام الميكنة فى العمليات الزراعية المختلفة مثل التسوية بالليزر والحرث لعمق ٤٠ سم واستخدام البلانتر فى زراعة بنجر السكر هى أفضل المعاملات للحصول على أعلى انتاجية وجودة لمحصول بنجر السكر فى الأراضى الجديدة بمنطقة النوبارية.