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Sugar Beet (*Beta vulgaris* L.) Production by a Package of Tillage Systems, in Guneid Area (Sudan)

Elwaleed M.H. Basheeir[1], Mohamed H. Dahab[2], Salah Eldin A. Mukhtar[3]

1.Faculty of Agricultural Sciences, University of Gezira, Sudan,
2 Faculty of Agricultural, University of Khartoum, Sudan
3 Guneid Sugar Cane Research Centre, Sudan

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Abstract

The present research study was carried out at Guneid Research Sugar Cane Center during the two seasons of 2014 and 2015.The objective was to investigated the effect of four tillage systems (mouldboard plowing (T_1), disc plowing (T_2), chisel plowing (T_3) and disc harrowing (T_4)), The parameters measured were soil moisture content SMC, some crop parameters (germination ratio (GR), root thickness (RIMD), root number per feddan (RNPF), leaf weight (LW), root crop yield (RY), polarization or sugar content (Pol%), estimated recovery sugar (ERS%) and sugar beet production (TSB). A complete randomized block design with four replications was used in this study. The results showed that tillage treatments significantly ($P \leq 0.05$) affected soil moisture and the maximum soil moisture content (22.5%) was recorded at the third depth (30-45cm) by T_3 while the minimum soil moisture content (15.5%) was recorded at the first depth (0-15cm) by T_4. Different tillage systems significantly ($P \leq 0.05$) affected RNPF and GR. The maximum value of RNPF 26157 roots/feddan, GR (76.2%) and TSB (4.2 ton/feddan) and were given by T_2 treatment, while the maximum RIMD (35.5 cm)were recorded by T_3 treatment and the maximum values of Pol% (18.6%) and ERS% (16.9%) were recorded by T_4 treatment. While the minimum values of RY, (24.6 ton/feddan) and GR (66.5%) were given by T_3 treatment. It was concluded that using disc plowing increased sugar production from sugar beet crops at Guneid Research Sugar Cane Center.

Keywords: Tillage Systems,` Sugar beet, Guneid Area

Introduction

Sugar beet (*Beta vulgaris*) is one of the most important sugar production crops (Sohrabi and Heidari, 2008; Abdel-Motagally and Attia, 2009). It is a hardly biennial plant whose root contains a high concentration of sucrose (15-20%). It is grown commercially for sugar production in a wide variety of temperate climates. Tillage is one of the most important production factors that influence soil physical and mechanical properties (Rashidi and Keshavarzpour, 2008), and consequently crop yield (Rashidi *et al*., 2009). Although, for most situations conventional tillage has been the main tillage method for establishing sugar beet since the first part of the 20th century, they are now expensive operations in terms of work rate

and fuel consumption (Ecclestone, 2004). Soil moisture content depends on precipitation rate, air temperature, and relief, depth of ground water, soil type, humus content, water infiltration rate and grown plants (He *et al.*, 2007; Martínez *et al.*, 2011). Moisture regime (especially deficit) limits the formation of plant productivity, reduces the possibility of realizing the cumulated bio-potential, which cannot be com- pensated in later plant growth stages. Therefore, soil water resource optimization in order to increase its efficiency in reducing environmental degradation processes, is one of the most important objectives in agriculture (Flexas *et al.*, 2006, Nakayama *et al.*, 2007).Fernades *et al.* (1988) found that in the upper 20 cm , the chisel plowing gave the lowest value of bulk density and highest value of total porosity compared to conventional plowing and no-tillage . Sharma *et al* (1988) summarized that tillage significantly decreased soil penetration resistance bulk density of surface soil layers. Power harrows may also be used to prepare sugar beet seedbeds. Larney *et al*. (1988) found that they were very efficient in preparing seedbeds in few passes on poorly structured soils with hard, dry or cloddy surface layers overlying moist, plastic layers. On well-structured soils, however, towed harrows were just as efficient and could produce an even larger proportion of fine aggregates. Different tillage systems loosen soils at different depths and change soil physical properties at different scales (Hamza and Anderson 2005; Strudley *et al*., 2008). Shahram *et al.* (2012) were study the effect of different tillage methods on yield and quality of sugar beet. Tillage treatments were moldboard plow + two passes of disk harrow (MDD) and moldboard plow + one pass of rotavator (MR) as conventional tillage methods; chisel plow + one pass of rotavator (CR) and two passes of disk harrow (DD) as reduced tillage methods; one pass of rotavator (R) and one pass of tine cultivator (C) as minimum tillage methods and no-tillage (NT). The root yield and quality characteristics of sugar beet *viz.* were measured for different tillage treatments. Results of the study indicated that different tillage methods significantly affected K, but no significant differences were found in root yield, sugar content, Na, alpha-amino nitrogen and molasses. Although, there was no significant difference in most studied traits, tillage operations were useful in improving the root yield and quality characteristics of sugar beet. Romanecka *et al.* (2009) study the effect of different conservation primary soil tillage on sugar beet. The aim of the trial was to establish the influence of reduced soil tillage intensity on some soil physical properties, sugar beet yield and quality, and weed infestation. Treatments of the trial: 1. conventional (22-25 cm) ploughing with a mouldboard plough (CP); 2. shallow (12-15 cm) ploughing with a mouldboard plough(SP); 3. deep (25-30 cm) cultivation with a chisel cultivator (DC); 4. shallow (10-12 cm) loosening with a disc harrow (SL); 5. Zero-tillage (ZT). Reduction of primary soil tillage intensity increased the amount of moisture and level of soil bulk density in the soil upper layer (0-10 cm). The highest amounts of moisture and soil bulk density were observed in no tilled soil (ZT) before pre-sowing soil tillage (25.8% and 1.40 Mg m-3) and after sowing until sugar beet germination (23.6% and 1.40 Mg m-3). Soil tillage intensity had no significant influence on soil moisture content and bulk density in a deeper (10-20 cm) layer. Sugar beet seed germination in shallow loosened soil (SL) was higher in comparison with control treatment (CP). Average data showed that germination of directly sowed seeds was less by 37% in comparison with conventional ploughing (CP). Reducing of soil tillage intensity to zero tillage had no significant influence on sugar beet yield, ramification

and sucrose content of root-crop. The reduction of soil tillage intensity and refusal to use full-scale herbicides had negative, but not significant influence on weed infestation in the sugar beet crop, except in the no-tillage pattern. Majid (2011) study the response of root yield and yield components of sugar beet (*Beta vulgaris*) to different tillage methods. Tillage treatments in the study were moldboard plow + two passes of disk harrow (MDD) as conventional tillage method; moldboard plow + one pass of rotavator (MR), chisel plow + one pass of rotavator (CR) and two passes of disk harrow (DD) as reduced tillage methods; one pass of rotavator (R) and one pass of tine cultivator (C) as minimum tillage methods, and no-tillage (NT) as direct drilling method. Root yield (RY) and some yield components such as root number per hectare (RNPH), sugar yield (SUGY), root dry matter (RODM), root length (ROTL), rim diameter (RIMD) were determined for all treatments. Different tillage methods significantly affected RNPH, but there was no significant difference in other studied traits. Although there was no significant difference in RY, SUGY, RODM, ROTL and RIMD, results of the study showed that tillage practices were beneficial in improving the yield of sugar beet. Results also showed that tillage method affected the yield of sugar beet in the order of MR > CR > R > MDD > DD > C > NT. Therefore, the reduced tillage treatments MR and CR, and the minimum tillage treatment R were considered as more appropriate and profitable tillage methods in improving the yield of sugar beet. Cavalaris and Gemtos (2002) conservation tillage in Central Greece in order to evaluate the profits the tested methods were: reduced tillage with a heavy cultivator (HC), rotary cultivator (RC), disk harrow (DH) and no-tillage (NT) compared with a conventional tillage method (CT) using plough. Reduced tillage methods caused an increase of weeds, of the soil dry bulk density, penetration resistance and shear strength. Soil retained a greater amount of water in the seedbed layer. Plant growth was better in the methods of CT and HC. Conservation tillage reduced yields compared to CT method, by 1, 2-8, 9% in the HC by 19, 7-34, 3% in the RH, by 20,4-31,3% in the DH and by 26, 1-46, 6% in the NT. Several variety adaptability trials were carried out at Guneid and Sennar 1998/1999, Kenana 2000/2001 (Obeid and Tahir, 2003). They all reported encouraging results of root and sugar yields. Root yields as high as 121.87 ton/ha with 15.6 % sugar content was reported in season 2002/2003 in experiments conducted at Dongola Research Station. Three varieties namely; Mashad, Juvena and Valentina were tested over the sowing date range of 15/9/2003 to 30/10/2003 at the Sugar Cane Research Center – Guneid. The average root yield was lowest in the late sowing date (October 30). The average sugar yield was highest (12.24 ton/ha) in the (October 10) sowing date.

Materials and Methods

Materials

Research site

This study was conducted at Guneid Sugar Cane Research Center which lies on the eastern bank of the Blue Nile, 117 km south of Khartoum, latitude 14°30′N and longitude 33°15′E. The experiment was carried out for two successive growing seasons, October 2013 – April 2014 and October 2014- April 2015.

Soil of the experimental area

The soil is classified as aridosol low in organic matter (O.M), total nitrogen (< 0.05 %), organic carbon 0.41%, hydraulic conductivity 1.04 Cmh^{-1}, pH 8.7, ESP 3 and low in available P (< 10 ppm). The mechanical analysis of the soil clay 45%, sand 28% and silt 27%. The average bulk density 1.75% and the average moisture content 15%. Guneid Sugarcane Scheme

falls within the aridic climatic zone which is characterized by relatively cool winters, hot summers, low rainfall, low relative humidity and a potential evapotranspiration exceeding precipitation throughout the year.

Methods

Experimental treatments and design

The tillage treatments used in the experiment were the following:

T_1 = Moldboard plow plus disk harrow plus ridging

T_2 = Disk plow plus disk harrow plus ridging .

T_3 = Chisel plow plus disk harrow plus ridging.

T_4 = Two passes of disk harrowing plus ridging.

The treatments were arranged in a randomized complete block design with four replications.

Experimental land preparation

The land was prepared by the main tillage treatments (moldboard plow, disc plow, chisel plow and disc harrow) before three weeks from planting for every replication, then the land was harrowed by the disc harrow before one week from planting and also furrowed by ridger at the same time of planting.

Soil moisture content

The soil moisture content as percentage was measured three times, after 45 days from planting, after 120 days from planting and at harvesting at three depths (0 – 15 cm, 15 – 30 cm and 30 – 45 cm). The soil samples were taken using a standard soil auger, weighed, oven-dried at105^{o}C for 24 hours, and then reweighed. The soil moisture content (%) was determined using the following equation (Blake and Hartge, 1986):

$$M.C\ \% = \frac{Ww - Wd}{Wd} \times 100 \quad \text{……………………………..….. (1)}$$

Where:

M.C% = Percent soil moisture content on dry basis.
Ww = Wet weight of soil sample (gm).
Wd = Dry weight of soil sample (gm).

Crop performance measurements

Plant germination percentage

The plant germination ratio was determined for the tillage treatments by the following equation:

$$\text{Germination ratio\%} = \frac{\text{Number of germinated seeds}}{\text{Number of actual seeds per row}} \times 100 \quad \text{…..(2)}$$

Root thickness

The tab meter was used to measure the thickness of the tuber at harvest. It was measured by putting the measuring tab around the middle of the tuber and measuring the root thickness. Five plants per sub subplot were selected randomly and measured from harvested rows and then the average was taken.

Plant population

At harvest, the number of tubers was counted for an area of 7.5 m^2 in each sub subplot. The number of tubers per feddan was determined by the following equation:

Number of tubers per feddan =

$$\frac{4200 \times \text{number of tubers counted per area}}{7.5\ m^2} \quad \text{…….....(3)}$$

Where:

7.5 = Area of one row (m^2).

4200 = Area of feddan (m^2).

Crop yield (tuber and leaf)

A spring balance was used to determine the weight of the sugar beet tuber and the weight of the leaves at the end of the season by harvesting one row 7.5 m^2 from each treatment. The leaves were separated from tuber and weighted. The weight of the sugar beet tubers and the weight of the leaves were determined by the following equations:

$$\text{Sugar beet ton per feddan} = \frac{4200 \times \text{yield of one row kg}}{7.5 \times 1000} \quad \text{……....…….(4)}$$

$$\text{Leaves weight in ton per feddan} = \frac{4200 \times \text{yield of one row kg}}{7.5 \times 1000} \quad \text{.....(5)}$$

Where:

7.5 = Area of one row (m^2).

4200 = Area of feddan (m^2).

Sugar Beet chemicals analysis

Before beet was harvested, 5 tubers were selected randomly from each sub subplot and then topped, cleaned from soil , crushed and sliced fine enough and samples were taken to determine the sugar beet chemical components.

The polarization or sugar content was determined by taking twenty six mg of sliced beet + reagents (174 cm^3 lead acetate), mixed in a blender and filtered. 200 ml of the extract was read in a Saccharimeter following (ICUMSA, 1994).

Sucrose percent in beet (Pol%) analysis

Estimated recovery sugar (ERS%) analysis

The sugar beet estimated recovery sugar (ERS%) was determined by following equation:

$$\text{ERS \%} = \text{Pol\%} - 2.5 \quad \text{……..…(6)}$$

Where:

2.5 = Expected losses of sugar content through production.

Sugar production from sugar beet

The sugar production from sugar beet ton sugar per feddan was determined by the following equation:

$$\text{Sugar ton per feddan} = \frac{\text{ERS\%} \times \text{Yield of sugar beet per feddan kg}}{} \quad \text{...(7)}$$

Results and Discussion

Effect of tillage on soil moisture content

The analysis of variance (Table .1) showed that there was a significant difference ($P \leq 0.05$) between soil tillage treatments due to soil moisture content in the first depth (0-15 cm) and second depth (15-30 cm). While no significant difference with the third depth (30-45 cm). Moldboard plowing and chisel plowing increased soil moisture content by 8.4% and 1.6% respectively where, disc harrowing decreased soil moisture content by 4.1% at the first depth (0-15cm) when compared to disc plowing. For the second depth (15-30 cm), the soil moisture increased by 3.83% and 4.3% for moldboard plowing and chisel plowing respectively, while it decreased by 5.2% for disc harrowing when compared to disc plowing. This may be due to the high depth of operation for these implements and this was in agreements with He *et al.* (2007) and Martinez *et al.* (2011). The average soil moisture content for the first season was 17.2%, 19.1% and 20.8% for the first, second and third depths respectively, while for the second season it was 15.6% and 20.4% and 22.7% for the three above depths in sequence.

Table (1) Effect of tillage on soil moisture content at different depth season 2014 and 2015

Treatments	Soil moisture content (%)		
	D_1	D_2	D_3
T_1	17.5	20.6	22
T_2	16.2	19.8	21.1
T_3	16.4	20.7	22.5
T_4	15.5	18.8	20.6
C.V	8.48	4.94	8.94
S.E	0.28	0.20	0.39
L.S	*	*	ns

Where:

L.S = level of significance at ($P \leq 0.05$) ns= not significant * = significant ** = highly significant. T_1:moldboard plowing treatment, T_2:disc plowing treatment ,T_3 :chisel plowing treatment, T_4 : disk harrowing treatment,

Crop performance

Germination percentage

The results obtained for germination percentage of the crop is shown in Table (2). The analysis of variance showed a significant difference ($P \leq 0.05$) due to tillage treatments. Disc plowing and moldboard plowing recorded the highest germination percentage of 76.2% and 73.4%, respectively. The average germination percentage for the first season and second season were 75.4% and 67.5%, respectively.

Table (2) Effect of tillage treatments on sugar beet yield and some yield components

Parameters					
Treatments	**RIMD**	**RY**	**RNPF**	**LW**	**GR**
T1	**34.0**	**26.8**	**25130**	**4.4**	**73.4**
T2	**33.8**	**28.4**	**26157**	**4.7**	**76.2**
T3	**35.5**	**24.6**	**22412**	**4.3**	**66.5**
T4	**34.5**	**24.7**	**24232**	**4.3**	**69.5**
C.V	**15.88**	**35.69**	**9.91**	**16.90**	**12.56**
S.E	**0.79**	**1.35**	**350.32**	**0.11**	**1.29**
L.S	**ns**	**ns**	*	**ns**	*

Where:

RIMD: root thickness RY: root yield RNPF: root number per feddan LW: Leaf weight GR: germination percentage.

The root thickness

The result obtained for root thickness or diameter are shown in Table (2). The analysis of variance showed in significant difference between tillage treatments. The root thickness was higher by 1.7 cm, 0.8 cm and 0.3 cm for chisel plowing, disc harrowing and moldboard plowing respectively, as compared with disc plowing. This is in agreement with results of Majid (2011).

The plant population

The results of plant population (plants/feddan) are shown in Table (2). The analysis of variance showed significant difference ($P \leq 0.05$) between tillage treatments where the highest plant population was recorded by disc plowing and moldboard plowing treatments as 26157 and 25130 plants/feddan, respectively. The lowest plant population was recorded by the chisel plowing treatment (22412 plant/feddan). This was in agreement with results of Majid (2011).

The crop leaf weight

The results obtained for crop leaf weight are shown in Table (2) . The analysis of variance showed no significant difference between tillage treatments regarding to leaf weight. the moldboard plowing, chisel plowing and disc harrowing treatments recorded lower leaf weight by 6%, 8.4% and 8.6%, respectively, as compared to disc plowing.

The crop yield

The results obtained for crop yield (ton/feddan) are shown in Table (2). The analysis of variance showed no significant difference in the yield due to tillage treatment. The moldboard plowing, disc harrowing and chisel plowing were recorded lower crop yield by 1.6 ton, 3.6 ton and 3.7 ton than disc plowing, respectively. This is in agreement with Kuc and Zimny (2005), Romanecka *et al* (2009), Majid (2011) and Shahram *et al.* (2012) results.

Sugar beet chemical analysis

Polarization or sugar content (Pol%)

The results of polarization or sugar content (Pol%) are shown in Table (3). The analysis of variance showed no significant differences on sugar content due to tillage treatments. Disc harrowing and moldboard plowing increased sugar content by 0.83% and 0.50% respectively, while chisel plowing decreased sugar content by 0.49% when compared to disc plowing treatment. This was in line with Romanecka *et al.* (2009) and Shahram *et al.* (2012) results.

Estimated recovery sugar (ERS%) The results obtained for estimated recovery sugar (ERS%) are shown in Table (3). The analysis

of variance showed insignificant difference due to the effect of tillage treatments.

Table (3) Effect of tillage treatments on sugar beet chemical analysis

Treatments	Parameters		
	Pol%	ERS%	TSB/Fed
T_1	18.3	15.8	4.1
T_2	17.8	15.3	4.3
T_3	17.3	14.8	3.6
T_4	18.9	16.9	3.9
C.V	10.96	13.19	20.44
S.E	0.28	0.29	0.12
L.S	Ns	ns	ns

Where:

Pol: polarization or sugar content ERS: estimated recovery sugar TSB: ton sugar beet.

Sugar beet production

The results of sugar beet production (ton/feddan) are shown in Table (3). The analysis of variance showed no significant difference between tillage treatments. The disc plowing treatment produced higher sugar beet than moldboard plowing by 3.17%, disc harrowing by 8.72% and chisel plowing by 17.13%.

Conclusions

From the results the following conclusions can be drawn:

1. Different tillage treatments signify-cantly ($P \leq 0.05$) affected soil moisture at the first (0-15cm) and second (15-30cm) depths but there was no significant difference at the third depth (30-45cm) it was observed to increase with depth and time for all tillage treatments.
2. Tillage treatments significantly ($P \leq 0.05$) affected the plant population and the germination ratio but there was no significant difference in root thickness, leaf weight, crop yield and sugar beet quality.

Generally, soil tillage treatments affected soil moisture content and bulk density and their application was beneficial in improving the yield and quality of sugar beet. Also, the minimum tillage treatment disc harrowing was considered as more appropriate and profitable tillage methods in improving the yield of sugar beet.

References

Alamouti, M.Y. and Navabzadeh, M. (2007). Investigating of plowing depth effect on some soil physical properties. Pakistan Journal of Biological Sciences, 10: 4510-4514.

Ecclestone, P. (2004). To plough or not to plough? British Sugar Beet Review, 72: 7-11.

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

Fernandes, B. and Celloway, H.M. (1988). Effect of three tillage systems on bulk density, total soil porosity and pore size distribution of two soils. Soil and fertilizer, 51: 11.

Flexas, J.J.; Bota, J.; Galmés, H.; Medrano, and M. Ribas-Carbó, (2006). Keeping a Positive Carbon Balance under Adverse Conditions: Responses of Photosynthesis and Respiration to Water Stress. Physiologia Plantarum, 127(3): 343-352.

Hamza, M.A. and Anderson, W.K. (2005) .Soil compaction in cropping systems, a review of the nature, causes, and possible solutions. Soil and Tillage Res., 82: 12-145.

He, J.H.W.; Li, X.Y., Wang, A.D.; McHugh, W.Y.; Li, H.W.; Gao and Kuhn, N.J. (2007). The Adoption of Annual Sub-soiling as Conservation Tillage in Dryland Maize and Wheat Cultivation in Northern China," Soil and Tillage Res., 2: 493-502.

ICUMSA, Method Book, (1994). International Commission for Uniform Methods of Sugar Analysis, GS 6(1-3).

Larney, F.J., Fortune, R.A. and Collins, J.F. (1988). Intrinsic soil physical parameters influencing intensity of cultivation procedures for sugar beet seedbed preparation. *Soil and Tillage Res.*, 12: 253-267.

Majid, R. **(2011).** Responses of root yield and yield component of Sugar beet (*Beta vulgaris*) to different tillage methods. Tehran, Iran *Journal of Agricultural and Biological Science* Vol. 6(8).

Martínez, I.G., Ovalle1,C.; Del Pozo, A., Uribe, H.; Valderrama, N.V., Prat, Ch., Sandoval, M. , Fernández, F. and Zagal, E. (2011). Influence of Conservation Tillage and Soil Water Content on Crop Yield in Dryland Compacted Alfisol of Central Chile," *Chilean Journal of Agricultural Research*, 71(4): 615-622.

Nakayama, N., Saneoka, H. and Moghaieb, R.E.A. (2007). Re-sponse of Growth, Photosynthetic Gas Exchange, Trans-location of 13C-Labelled Photosynthetic and Accumulation in Two Soybean (*Glycine max* L. Merrill) Cultivars to Drought Stress, *International Journal of Agriculture and Biology*, 9(5): 669-674.

Obeid, A. and Tahir, M. (2004). Evaluation of some tropical sugar beet (*Beta vulgaris*) cultivars. Unpublished report of Kenana Research Station. Sudan.

Rashidi, M. and Keshavarzpour, F. (2008). Effect of different tillage methods on soil physical properties and crop yield of melon (*Cucumis melo*). American-Eurasian J. Agric. and Environ. Sci., 3: 31-36.

Rashidi, M., Gholami, M. and Khabbaz**, B.G. (2009)**. Response of yield and yield components of tomato (*Lycopersicon esculentum*) to different tillage methods. Int. J. Agric. Biol., 11: 626-630.

Romanecka, K.R., Romaneckien, C., Šarauskis, E., Pilipavicius, V. and Sakalauskas, A. (2009). The effect of conservation primary and zero tillage on soil bulk density, water content, sugar beet growth and weed infestation**.** Agronomy Research, **7**(1): 73-86.

Shahram, M.N., Majid, R., Seyyed, M.O.M. and Mehrdad, N. (2012). Effect of Different Tillage Methods on Yield and Quality of Sugar Beet. Ardabil

Province Jahad-e-Keshavarzi Education Center, Ardabil, Iran Department of Agricultural Machinery, Takestan Branch, Islamic Azad University, Takestan, Iran Middle-East Journal of Scientific Research, 12(6): 859-863.

Sharma, P.K., De Atta, S.K. and Redulla, E.A. (1988). Tillage effect on soil physical properties and wet land rice yield. Agronomy Journal, 80: 34-39.

Strudley, M.W. Green, T.R. and Ascough, J.C. (2008).Tillage effects on soil hydraulic properties in space and time. Soil and Tillage Res., 99: 4-48.

Zahoor. A., Faridullah, P., Shah, K., Kakar, M. and Sanaullah, B. **(2007).** Sugar beet (*Beta vulgaris* L.) response to different planting methods and row geometries I. Effect on plant growth and yield. Archive Agronomy soil Sci., 53:49-61.

إنتاج بنجر السكر عن طريق بعض حزم نظم الحراثة في منطقة الجنيد (السودان)

الوليد محمد حسن[1] ، محمد حسن دهب[2] ، صلاح الدين عبدالقادر مختار[3]

1. جامعة الجزيرة ، كلية العلوم الزراعية
2. جامعة الخرطوم كلية الزراعة
3. مركز ابحاث سكر الجنيد

المستخلص

أجري هذا البحث في مركز ابحاث سكر الجنيد في موسمي 2014 و2015 لدراسة تأثير أربعة انظمة للحراثة (المحراث المطرحي، المحراث القرصي، المحراث الازميلي والمشط القرصي) على نمو وانتاج محصول بنجر السكر والعائد المادي من الانتاج. وكانت المعاملات قياس رطوبة التربه وبعض المعاملات للمحصول (نسبة الإنبات، سمك الجذر،عدد النباتات للفدان، وزن الاوراق، انتاج المحصول، الاستقطاب أو محتوى السكر، تقدير السكر االمستخلص وإنتاج السكر من بنجر السكر). تم استخدام نظام التصميم العشوائى الكامل باربعة مكررات في هذه الدراسة. أظهرت النتائج أن معاملات الحراثه اثرت بشكل كبير ($P \leq 0.05$) على رطوبة التربة على ألعمق الأول والثاني تم تسجيل أقصى محتوى رطوبة للتربة (22.5٪) في العمق الثالث (30–45سم) بواسطة المحراث الازميلى، في حين ان الحد الأدنى من رطوبة التربة (15.5٪) قد سجلت عند العمق الأول(0–15سم) بواسطة المشط القرصى. طرق الحراثة المختلفة أثرت معنوياً ($P \leq 0.05$) على نسبة الانبات وعدد النباتات للفدان. وقد لوحظت القيم القصوى من عدد النباتات (26157 نبات/فدان)، نسبة الانبات(76.2٪) وانتاج السكر (4.2 طن/فدان) في حالة المعامله بواسطة المحراث القرصى، في حين سجل أقصى سمك للجذر(35.5سم) في حالة المعامله بواسطة المحراث الازميلى والقيم القصوى لمحتوى السكر(18.6٪) وتقدير السكر المستخلص (16.9٪) سجلت في حالة المعامله بواسطة المشط القرصى. بينما، لوحظت قيم الحد الأدنى من الانتاج (24.6 طن/فدان) ونسبة الانبات (66.5 ٪) في حالة المعاملة بواسطة المحراث الازميلى. يمكن الاستنتاج بان استخدام المحراث القرصى يؤدى الى زيادة إنتاج السكر من محصول بنجر السكر في مركز ابحاث قصب سكر الجنيد.