Effect of Harvesting Age of some Sugar Beet Varieties Grown in a New Reclaimed Soil in Sohag

Ahmed F.I. Gadallah and Sahar, F. Tawfik[1]

ABSTRACT

Two field experiments were carried out at western desert of Sohag Governorate, Egypt (latitude of 26° 61' N, longitude of 31? 52 ' E and altitude of 72 m) in 2015/2016 and 2016/2017 seasons to find out the optimal plant age at harvest (180, 195 and 210 days from sowing) of the three multi-germ sugar beet varieties namely Hosam, Sahar and Kawemira under condition of a new reclaimed soil in Sohag. A Randomized complete blocks design using a split-plot arrangement with four replications was used in both seasons, where the main plots were devoted for sugar beet varieties, while plant ages of harvesting were randomly distributed in the sub plots.

The results showed that sugar beet varieties differed significantly in all studied traits. Hosam variety was superior in root length, root yield/fed and root fresh weight/plant in both seasons. However Kawemira variety had the thickest root diameter and heaviest top fresh weight/fed in both seasons, as well as TSS% in the1st one. Sahar variety attained the highest values of sucrose and sugar yield/fed in both seasons, in addition to TSS% and purity% in the 2nd one.

delaying harvesting from 180 up to 210 days from sowing increased significantly root length, diameter and root fresh weight/plant, root and sugar yield/fed as well as TSS and sucrose % in both seasons and purity % in the 1st one. Beets harvested at age of 180 days attained the highest value of top fresh weight/fed in both seasons.

Interactions between sugar beet varieties and ages of harvesting were significant except purity%, in the1st season. In the 2nd one, TSS, sucrose %, root and sugar yield/fed were significantly affected by the interaction between the two factors.

Under the conditions of this work, harvest sugar beet Hosam and Sahar varieties after 210 days after sowing can be recommended to obtain the highest root and sugar yields/fed in the new reclaimed soil in Sohag Governorate.

Key Wards: harvesting age, quality, root yield, sugar beet variety.

INTRODUCTION

Sugar beet (*Beta vulgaris var. saccharifera*, L.) is the second source of sugar all over the world, while it is considered the most important crop for extraction sugar in Egypt. Since sugar beet crop can be grown in a wide range of soils and climates, expanding of its cultivated area in sandy lands became a possible solution to minimize the increasing demand for sugar. Meantime, all sugar beet genotypes cultivated in Egypt are imported from foreign countries. Therefore, this study was conducted to evaluate some of them under Egyptian conditions especially under newly reclaimed soils in different sowing dates and harvesting ages to make a varietal map to define the best varieties for each area as the sandy soils in west of Sohag governorate. The differences between varieties in gene make-up expression may throw some light on the relative importance of studying varieties performance throughout the growing season. Aly, *et al.* (2011) reported that sugar beet cultivars differed significantly in studies traits, where Kawemira variety showed the superiority in root fresh weight/plant, root and sugar yields/fed, while, LP12 and Demapoly varieties had the highest value for sucrose, extraction sugar and extractability percentages. Ramadan and Nassar (2004) and Azzazy, *et al.* (2007) found great variation among sugar beet varieties in yield, quality and its components. Enan, *et al*. (2009) found that sugar beet varieties differed significantly in all studied traits except TSS%. Farida variety gave a significant increase for sugar yield, TSS, sucrose and purity%, while it recorded the lowest values of impurities (Na, K and N %). Abd El-Aal, *et al*. (2010) revealed that sugar beet varieties showed significant variation in yield productivity and root quality. Kawemira and Gloria varieties gave the highest sugar yield followed by Nejma.

Enan, *et al*. (2011) obtained significant difference among sugar beet varieties in their yield potential. Cleopatra variety recorded the highest sucrose%, while Florima and Heracule varieties produced the highest root and sugar yields/fed. Aly, *et al*. (2012) found that sugar beet varieties significantly differed in root length, diameter, root fresh weight/plant, sucrose%, purity% and root and sugar yields/fed, root mineral content. Kawemira variety surpassed Sultana and Top in most studied traits. Aly (2012) evaluated three sugar beet varieties Kawemira, Carola and Farida. He fond that sugar beet varieties differed significantly in all study characters and that Carola variety was superior in root and top fresh weight/plant, sucrose%, TSS, purity% root and sugar yields/fed. Al-Labbody, *et al*. (2012) revealed that Farida and Sultan varieties significantly varied in root length, diameter, root fresh weight, out yielded the other varieties in root and sugar, sucrose% and impurities%. Farida variety was superior in sucrose% and low impurities%, while Sultan variety

[1]Sugar Crops Res. Inst., Agric. Res. Center, Giza, Egypt
Received December 05,2017, Accepted December 31, 2017

significantly recorded the best values of root diameter, root fresh weight/plant, purity%, root and sugar yields/fed. Afez (2016) indicated that sugar beet varieties significantly differed for root length, diameter, TSS%, sucrose%, sugar, top and root yields/fed. Bersea variety surpassed Danube and Tilman varieties in most studied traits.

Harvesting age is one of the main factors directly affects maturity and consequently juice quality and ultimately the expected root and sugar yields of sugar beet. In this respect, Aly (2006) harvested sugar beet at age of 180, 190 and 210 days. He found that delaying harvest dates up to 210 days from sowing increased significantly root length and diameter, sucrose%, root and sugar yields/fed. Nasr and Abd-El-Razek (2008) found that harvesting sugar beet after 210 days from sowing recorded the highest root weight, sucrose and purity percent as well as root and sugar yields/fed compared to that harvested at 170 and 190 days after sowing. Mahmoud, *et al.* (2008) mentioned that the maximum root and sugar yields/fed were obtained when sugar beet was harvested at 180-210 days after sowing. They added that varying varieties and harvesting dates effected sucrose and juice purity percentage, root and sugar yields/fed. El-Sheikh, *et al.* (2009) reported that delaying harvest dates from 180 to 210 days attained a gradual and significant effect on sucrose% and sugar yield as well as root fresh weight/plant and root and sugar yields/fed. They added that the difference between 180 and 195 days was negligible. Aly, *et al.* (2011) found that delaying harvest date from 175 to 205 days after sowing led to significant increases in root fresh weight/plant, root and sugar yield/fed as well as significant improvement in juice quality (sucrose%, extraction sugar% and extractability%). Aly (2012) and Hussein, *et al.* (2012) and found that late harvesting of sugar beet (210 days after sowing) gave the highest root dimension (length and diameter), root yield/fed, the best quality (sucrose and TSS%) and root and sugar yields compared with harvesting it at 180 days after sowing. Mohamed and Yasin (2013) reported that delaying harvesting date up to 210 days after sowing significantly increased yields of root and sugar/fed, compared with 180 days. Awad, *et al.* (2015) tested three sugar beet cultivars namely Juvena, Mashad and Valentina under six harvesting age intervals of 4.5, 5.0, 5.5, 6.0, 6.5 and 7.0 months. They cleared that the maximum sucrose content was attained at age of 4.5 and 5.0 months. Beet cultivar Valentina maintained reasonably high sucrose level till age of 5.5 (March 30th) as the adapted cultivar Juvena. Best harvesting date was early Febuary to early March for all beet varieties tested. There was a severe decline in sugar content at age older than 6 months. This study was conducted in the new lands west of Sohag governorate.

MATERIALS AND METHODS

A field experiments were carried out at western desert of Sohag Governorate, Egypt (latitude of 26˚ 61' N, longitude of 31? 52' E and altitude of 72 m) in 2015/2016 and 2016/2017 seasons to find out the optimal plant age at harvest (180, 195 and 210 days from sowing) of the three multi-germ sugar beet varieties namely Hosam, Sahar and Kawemira under conditions of a new reclaimed soil in Sohag. A Randomized complete blocks design using a split-plot arrangement with four replications was used in both seasons, where the main plots were devoted for sugar beet varieties, while plant ages of harvesting were randomly distributed in the sub plots.

Table 1. physical and chemical properties of the experimental sites

Soil property		2015/2016	2016/2017
	Sand %	87.78	86.89
Physical analysis	Silt %	5.01	4.90
	Clay %	7.21	8.21
Soil texture		Sandy	Sandy
	Co_3^-	0.12	0.14
	HCo_3^-	0.3	0.4
	Cl^-	20	21
	$So4^{--}$	2.7	2.7
Chemical analysis	Ca^{++}	0.20	0.21
	Mg^{++}	1.8	1.9
	Na^+	21	22
	K^+	0.12	0.13
	EC(ds/m)	2.5	2.6
	pH	8.4	8.5

Maximum and minimum monthly temperature (^{0}C), relative humidity (%) and wind speed (m/sec) as elucidated in Table (2).

Table 2. Average values of meteorological data recorded at Shandaweel Agricultural Research Station in 2015/2016 and 2016/2017 growing seasons

Month	Temp. degrees, °C		Relative humidity %		Wind speed (m/sec)
	T. max.	T. min.	Max. RH%	Min. RH%	
October 2015	36.7	19.0	84.5	24.9	16.3
November 2015	30.6	11.2	90.2	18.7	16.1
December 2015	23.9	5.2	93.2	21.2	15.6
January 2016	20.5	2.4	83.3	18.4	7.9
February 2016	27.8	8.1	68.2	15.1	12
March 2016	31.3	15.2	55.6	18.9	11.5
April 2016	37.2	17.5	48.0	13.8	10.9
May 2016	38.1	20.2	43.0	16.6	10.7
October 2016	34.3	14.8	66.9	15.6	16.1
November 2016	29.2	10.0	70.0	15.7	16.4
December 2016	23.6	5.2	72.0	16.0	15.8
January 2017	22.5	4.8	65.4	15.6	8.0
February 2017	24.5	6.3	57.0	14.3	13
March 2017	29.0	11.6	50.8	15.4	12.3
April 2017	35.0	17.0	42.6	14.8	11.1
May 2017	38.3	20.4	43.5	16.8	10.8

The experimental unit area was 21 m^2 (1/200 feddan), including 5 rows of 0.6 m apart and 7 m in length. Seeds were sown on the 20th and 25th of October in the 1st and 2nd seasons, respectively. Sugar beet crop was planted after fallow in both seasons. The soil of the experimental site was analyzed as shown in Table 1.

Maximum and minimum monthly temperature (^{0}C), relative humidity (%) and wind speed (m/sec) as elucidated in Table (2).

Overall application of Nitrogen, phosphorus and potassium were given to sugar beet plants at 100 kg N (as Urea in 3 doses, after thinning and 3 weeks later), 15 kg P_2O_5 (as superphosphate, 15% P_2O_5) and 24 kg K_2O (as potassium sulfate, 48% K_2O) per feddan, respectively.

The recorded data:

At harvest, the three guarded rows of each plot were harvested and a sample of 10 plants was randomly taken from each plot to determine the following traits:

1. Root length (cm).2. Root diameter (cm). 3. Root fresh weight (g).
4. Total soluble solids percentage (TSS%) was determined using "Hand Refractometer".
5. Sucrose% was estimated polarimeterically in the fresh samples of sugar beet roots, in a lead acetate extraction of fresh macerated root, according to the method of Le Docte (1927).
6. Juice purity% was calculated using the following equation:

Purity% = (sucrose% x 100) / TSS %.

Top, root and sugar yields: Sugar beet plants of the three guarded rows were up-rooted, cleaned, topped and the following parameters were assessed:

1. Top yield/fed (ton).2. Root yield/fed (ton).

3. Sugar yield/fed (ton) was calculated using the following equation:

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

Data were statistically analyzed according to the method of Gomez and Gomez (1984). The treatment means were compared using the least significant difference (LSD) values at 5% level of significance.

RERSULTS AND DISCUSSION

1. Root length, diameter and fresh weight/plant:

Data presented in Table 3 show that Hosam variety showed the significant superiority over the other varieties in root length, diameter and root fresh weight/plant. However, Kawemira variety surpassed the other varieties in root diameter at harvesting in both seasons. Differences among the tested sugar beet varieties may be due to their genetical structure. These findings are in line with those reported by Al-Labbody, *et al*. (2012) and Afez (2016).

Delaying harvest age from 180 to 195 and 210 days gradually and significantly increased root length, diameter and fresh weight/plant. Harvesting sugar beet crop at 210 days resulted in increases of (9.95 and 10.88 %), (19.27 and 21.72 %) and (18.44 and 39.88%) for root length, diameter and root fresh weight/plant, compared with that harvested after 180 days from sowing, in the 1st and 2nd season, respectively. The

advantage of increasing the duration from planting to harvesting on these growth traits could be attributed to more dry matter accumulation with the advance of plant age. These results are in accordance with those reported by Aly (2006) and El-Sheikh, *et al.* (2009).

The interaction between sugar beet variety and harvest age had a significant influence on root length, diameter and root fresh weight/plant in the 1st seasons only.

It was noticed that the difference in root length and diameter between Sahar and Kawemira varieties was insignificant, when they were harvested at age of 210 days after sowing. However, Sahar variety surpassed Kawemira in root length significantly at age of 180 and 195 days, while Kawemira markedly surpassed Sahar in root diameter at the same two earlier ages.

2. Total soluble solids (TSS), sucrose and purity percentages:

Data in Table 4 indicate that the evaluated sugar beet varieties differed significantly in TSS and sucrose percentage in both seasons, while purity % was significantly influenced in the 2nd one. Sugar beet Sahar variety attained the highest value of sucrose in the two seasons as well as TSS% in the 1st season and purity%, in the 2nd one. However, Kawemira variety superposed the other varieties in TSS % in the 2nd season. These results are probably correlated to gene make-up of these beet varieties. These results are in accordance with those found by Azzazy, *et al.* (2007); Enan, *et al.* (2009); Abd El-Aal, *et al.* (2010); Aly, *et al.* (2012); El-Labbody, *et al.* (2012) and Afez (2016).

Delaying harvesting from 180 up to 195 and to 210 days after sowing, positively and significantly increased TSS, sucrose and purity percentage in both seasons. Harvesting sugar beet at 210 days gave the highest values of TSS, sucrose and purity percentage. These results coincide with those reported by El-Sheikh, *et al.* (2009); Enan, *et al.* (2009); Abd El-Aal, *et al.* (2010); Aly, *et al.* (2012); Hussein, *et al.* (2012); Mohamed and Yasin (2013) and Awad, *et al.* (2015).

Table 3. Effect of harvesting ages of sugar beet varieties and their interaction on root length (cm), root diameter (cm) and root weight (kg) in 2015/2016 and 2016/2017 seasons

Plant age at Harvesting	2015/2016				2016/2017			
	root length (cm)							
	Sugar beet variety			Mean	Sugar beet variety			Mean
	Hosam	Sahar	Kawemira		Hosam	Sahar	Kawemira	
180 day	24.03	22.82	21.89	22.91	23.63	22.70	22.29	22.87
195 day	25.83	23.77	22.53	24.04	24.70	23.82	23.72	24.08
210 day	26.83	24.48	24.26	25.19	26.02	25.32	24.75	25.36
Mean	25.57	23.69	22.89		24.78	23.95	23.59	
LSD at 5%								
Sugar beet variety (A)				0.41				0.28
Harvesting age (B)				0.29				0.14
(A) x (B)				0.50				NS
	root diameter (cm)							
180 day	7.91	8.50	9.11	8.51	8.65	8.22	8.53	8.47
195 day	9.17	9.34	9.80	9.44	9.45	9.18	9.43	9.36
210 day	9.73	10.11	10.61	10.15	10.23	10.00	10.68	10.31
Mean	8.94	9.32	9.84		9.44	9.13	9.55	
LSD at 5%								
Sugar beet variety (A)				0.52				0.22
Harvesting age (B)				0.29				0.15
(A) x (B)				0.50				NS
	Root fresh weight (kg)							
180 day	0.922	0.910	0.870	0.922	0.977	0.878	0.845	0.900
195 day	1.192	1.162	1.147	1.167	1.238	1.191	1.119	1.183
210 day	1.340	1.290	1.260	1.297	1.318	1.248	1.209	1.259
Mean	1.173	1.121	1.092		1.178	1.106	1.058	
LSD at 5%								
Sugar beet variety (A)				0.035				0.024
Harvesting age (B)				0.008				0.018
(A) x (B)				0.014				NS

Table 4. Effect of harvesting ages of sugar beet varieties and their interaction on total soluble solids, sucrose and purity percentages in 2015/2016 and 2016/2017 seasons

Plant age at Harvesting	2015/2016				2016/2017			
	Total soluble solids percentage (TSS%)							
	Sugar beet variety			Mean	Sugar beet variety			Mean
	Hosam	Sahar	Kawemira		Hosam	Sahar	Kawemira	
180 day	18.23	18.87	18.60	18.57	18.10	19.17	19.03	18.77
195 day	20.47	21.87	20.87	21.07	21.50	21.97	22.40	21.96
210 day	22.43	22.97	21.80	22.40	22.83	23.10	23.87	23.27
Mean	20.38	21.23	20.42		20.81	21.41	21.77	
LSD at 5%								
Sugar beet variety (A)				0.56				0.27
Harvesting age (B)				0.33				0.12
(A) x (B)				0.58				0.20
	Sucrose percentage							
180 day	14.05	14.42	14.58	14.35	15.47	16.02	14.12	15.20
195 day	16.79	18.36	16.82	17.32	18.53	18.84	18.91	18.76
210 day	18.77	19.13	17.88	18.60	19.01	19.23	19.91	19.38
Mean	16.54	17.31	16.43		17.67	18.03	17.65	
LSD at 5%								
Sugar beet variety (A)				0.60				0.09
Harvesting age (B)				0.43				0.09
(A) x (B)				0.74				0.16
	Purity percentage							
180 day	77.13	76.43	78.38	77.32	77.90	78.30	78.30	78.17
195 day	82.06	83.95	80.61	82.21	80.35	81.95	81.57	81.29
210 day	83.69	83.30	82.00	83.00	82.46	83.35	81.26	82.36
Mean	80.96	81.23	80.33		80.24	81.20	80.38	
LSD at 5%								
Sugar beet variety (A)				NS				0.75
Harvesting age (B)				1.53				0.92
(A) x (B)				NS				NS

The interaction between sugar beet varieties x harvest age had a significant effect on TSS and sucrose % in both seasons. There was no significant variance in TSS and sucrose percentages between Sahar and Kawemira varieties by harvesting them earlier at age of 180 days, while harvesting later ate age of 195 and/or 210 days resulted in the significant superiority of Sahar over Kawemira in the two traits, in the 1st season. Similar tendency was observed with respect to TSS%, in the 2nd season. Insignificant difference in sucrose % was recorded between Sahar over Kawemira, when they were harvested at 195 days, with significant variance between them earlier or later harvesting ages, in the 2nd season.

3. Top, root and sugar yields:

Results in Table 5 demonstrate that the evaluated varieties of sugar beet significantly differed in top, root and sugar yields/fed. Kawemira variety surpassed significantly Hosam variety by 0.468 ton and Sahar insignificantly by 0.112 ton in top yield/fed, in the 1st season, corresponding to significant superiority of 0.702 and 0.207 ton/fed over Hosam and Sahar, respectively, in the 2nd season.

Hosam variety out-yielded Kawemira variety by 0.289 ton in root yield/fed, without significant difference with Sahar in root yield, in the 1st season. In the 2nd one, Hosam variety attained a substantial increase of 0.194 and 0.342 ton of roots/fed over that gained by Sahar and Kawemira, successively.

Sahar surpassed Kawemira significantly in sugar yield by 0.256 ton/fed, without marked variance with Hosam, in the 1st season. In the 2nd one, insignificant difference was detected in sugar yield/fed between the evaluated sugar beet varieties.

These observations assured that the final output of the tested varieties was affected by their gene make-up in addition to the surrounded environment. The obtained results are in coincidence with those obtained by Azzazy, *et al*. (2007); Enan, *et al*. (2009);

Table 5.Effect of harvesting ages of sugar beet varieties and their interaction on top, root and sugar yields/fed (ton) in 2015/2016 and 2016/2017 seasons

Plant age at Harvesting	2015/2016				2016/2017			
	Top yield/fed (ton)							
	Sugar beet varieties			Mean	Sugar beet varieties			Mean
	Hosam	Sahar	Kawemira		Hosam	Sahar	Kawemira	
180 day	9.747	10.103	10.097	9.982	9.750	10.087	10.300	10.046
195 day	8.850	9.193	9.353	9.132	8.680	9.257	9.437	9.124
210 day	7.750	8.117	8.300	8.056	7.557	8.127	8.357	8.013
Mean	8.782	9.138	9.250		8.662	9.157	9.364	
LSD at 5%								
Sugar beet variety (A)				0.174				0.095
Harvesting age (B)				0.134				0.124
(A) x (B)				0.232				NS
				root yield/fed (ton)				
180 day	24.762	24.582	24.340	24.561	24.435	24.383	24.243	24.354
195 day	25.378	25.352	25.194	25.308	25.561	25.323	25.116	25.333
210 day	26.366	26.183	26.106	26.218	26.457	26.165	26.067	26.230
Mean	25.502	25.372	25.213		25.484	25.290	25.142	
LSD at 5%								
Sugar beet variety (A)				0.189				0.108
Harvesting age (B)				0.063				0.069
(A) x (B)				0.110				0.119
				sugar yield/fed (ton)				
180 day	3.531	3.589	3.622	3.581	3.402	3.472	3.388	3.420
195 day	4.408	4.740	4.344	4.497	4.514	4.525	4.453	4.497
210 day	5.100	5.171	4.766	5.012	4.835	4.905	4.888	4.876
Mean	4.346	4.500	4.244		4.250	4.301	4.243	
LSD at 5%								
Sugar beet variety (A)				0.195				NS
Harvesting age (B)				0.100				0.064
(A) x (B)				0.174				0.111

Abd El-Aal, *et al.* (2010); Aly, *et al.* (2012); El-Labbody, *et al.* (2012) and Afez (2016).

Delaying harvesting age of sugar beet to 195 and 210 days after sowing caused a significant and gradual increase in root yield amounted to (3.05 and 6.75%) and (4.02 and 7.72%), as well as a significant increase in sugar yield of (25.57 and 39.96%) and (31.49 and 42.57%). However, top yield/fed decreased by (23.82 and 13.27%) and (25.46 and 13.85%), compared to beets harvested at 180 days, in the 1st and 2nd season, respectively. These increase in root yield/fed accompanied the delay in plant age of harvesting may be due increasing root length, diameter and fresh weight (Table 3), while the increase in sugar yield/fed may be referred to the increase in sucrose and purity percentages (Table 4) as well as the increase in root yield (Table 5).

The interaction of sugar beet variety x harvest age affected top yield significantly in the 1st season only. It was found that Kawemira variety produced 0.55 ton of tops/fed higher than that given by Hosam, when they were harvested at age of 210 days, while it surpassed Hosam by only 0.35 ton of leaves/fed at the earlier age of 180 days.

Root yield was significantly affected by the interaction between beet variety and harvesting age in both seasons. In the 1st season, insignificant variance in root yield between Sahar and Kawemira was detected, in case of harvesting them lately at 210 days, but Sahar markedly out-yielded Kawemira in this trait at the other earlier harvesting ages. In the 2nd season, Hosam recorded substantial increase in root yield over that produced by Sahar at the earliest harvesting age of 180 days, without any appreciable variance in root yield between the two varieties at 195 and 210 ages.

The interaction between beet variety and harvesting age had a significant influence on sugar yield in the 1st season. It was noticed that the difference between Hosam and Sahar varieties in sugar yield was

insignificant at the earlier and/or later harvesting age, but Sahar significantly surpassed Hosam in sugar yield at the middle age of harvesting.

CONCLUSION

Under conditions of the present results revealed that growing each of Hosam and/or Sahar sugar beet varieties and harvesting them at age of 210 days from sowing can be recommended to obtain the highest root and sugar yields/fed in the newly reclaimed soils in Sohag Governorate.

REFERENCES

Abd El-Aal, A.M., A.I. Nafie and Ranya M. Abdel Aziz. 2010. Response of some sugar beet genotypes to nitrogen fertilization under newly reclaimed land conditions. Egypt. J. Appl. Sci. 25 (6-B): 194-208.

Afez, A.A. 2016. Effect of growth inhibitors and planting dates on some varieties of sugar beet (*beta vulgaris*. L.). Ph.D. Thesis, Fac. Al-Azhar Univ.

Al-Labbody, A.H.S., A.I. Nafi, and E.F.A. Aly. 2012. Response of some sugar beet varieties to nitrogen sources under the newly reclaimed soil. Egypt. J. Appl. Sci., 27(4): 153-160.

Al-Sayed, M.H., U.A. Abd El Razek, H.M. Sarhan and Hayam S. Fateh. 2012Effect of harvesting dates on yield and quality of some sugar beet varieties. Aust. J. Basic Appl. Sci. 6(9): 525-529.

Aly, E.F. 2006. Effect of environmental conditions on productivity and quality of some sugar beet varieties. Ph.D. Thesis. Fac. Agric., Benha Univ., Egypt.

Aly, E.F.A., A.H.A.A. Al-Labbody and M.S.M. Aly. 2011. Effect of harvesting dates on quality and yield characteristics of some sugar beet varieties. Fayom J. Agric. Res. Dev. 25(1): 230-237.

Aly, M.S.M. 2012. Performance study of some sugar beet varieties under sowing and harvesting dates. J. Plant Prod., Mansoura Univ. 3(9): 2439-2449.

Aly, M.S.M., S.R.E. El Sheikh and M.M. Abd El-Rahman. 2012. Response of some sugar beet varieties to foliar spray with compost tea under newly reclaimed soils. Fayoum J. Agric. Res. Dev. 26(1): 99-105.

Awad, E.M., O.A. Ahmed and Ph.W. Marchelo. 2015. Evaluation of sowing date and harvest age of some sugar beet (*beta vulgaris* Subsp. *vulgaris*) cultivars under Guneid Condition, (Sudan). ISSN-2360-7971. 3(9): pp 421-424.

Azzazy, N.B., N.M.S. Shalaby and A.M. Abd El Razek. 2007. Effect of planting density and days to harvest on yield and quality of some sugar beet varieties under Fayoum condition. Egypt J. Appl. Sci. 22 (12-A): 101-14.

El Sheikh, S.R.E., K.A.M. Khaled and S.A.A.M. Enan. 2009. Evaluation of some sugar beet varieties under three harvesting dates. J. Agric. Sci. Mansoura Univ. 34 (3): 1559-1567.

Enan, S.A.A.M., A.M. Abd El-Aal and N.M.E. Shalaby. 2011. Yield and quality as affected by sowing date and harvest age. Fayom J. Agric. Res. Dev. 25 (2):51-65.

Enan, S.A.A.M., S.R.E. El Sheikh and K.A.M. Khaled. 2009. Evaluation of some sugar beet varieties under different levels of N and Mo fertilization. J. Biol. Chem. Environ. Sci. 4(1): 345-362.

Gomez, K.A. and A.A. Gomez. 1984. Statistical Procedures for Agricultural Research. John Willey and Sons. Inc. New York.

Hussein M.A., U.A. Abd El Razek, H.M. Sarhan and S. F. Hayam. 2012. Effect of harvesting dates on yield and quality of some sugar beet varieties. Aust. J. Basic Appl. Sci. 6(9): 525-529.

Le Docte process. Int. Sugar J., 29: pp 488-492. [C.F. Draycott, A.P. 1972. Sugar Beet Nutrition. Appl. Sci. Pub. Ltd, London].

Le Docte, A. 1927. Commercial determination of sugar in beet root using the Sacks.

Mahmoud, S.A.,B. Hasanin, I.H. El-Geddawy and D.T.A. Mosa. 2008. Effect of sowing and harvesting dates on yield and quality of some sugar beet varieties. Proc. Int. Conf. (IS-2008), Al-Arish, Egypt. Sep. 11-14, pp. 22-29.

Mohamed, Hanan, Y. and M.A.T. Yasin. 2013. Response of some sugar beet varieties to harvesting dates and foliar application of Boron and Zinc in sandy soils. Egypt. J. Agron. 35 (2): 227-252.

Nasr, M.I. and A.M. Abd El-Razek. 2008. Sugar beet performance under newly reclaimed soils conditions of Sinai, Egypt. Sugar Tech. 3: 210-218.

Ramadan B.S.H. and A.M. Nassar. 2004. Effect of nitrogen fertilization on yield and quality of some sugar beet varieties. Egypt. J. Agric. Rec. 82(3):1253-1268

الملخص العربي

تأثير عمر الحصاد لبعض أصناف بنجر السكر المنزرعة فى أرض حديثة الإستصلاح فى سوهاج

أحمد فتحي إبراهيم جادالله و سحر فايز توفيق

أُقيمت تجربتان حقليتان فى موسمى ٢٠١٥/٢٠١٦ و ٢٠١٦/٢٠١٧ فى أرض حديثة الإستصلاح فى الظهير الصحراوي الغربي بمحافظة سوهاج بمصر (دائرة عرض٦١,٢٦ درجة شمالاً وخط طول ٥٢,٣١ درجة شرقاً وإرتفاع ٧٢ متراً عن سطح البحر) بهدف دراسة تأثير ثلاثة مواعيد للحصاد (١٨٠ ، ١٩٥ ، ٢١٠ يوماً من الزراعة) لثلاثة أصناف من بنجر السكر (حسام ، سحر وكاوميرا). باستخدام تصميم القطع المنشقة مره واحدة في أربع مكررات ، حيث وزعت أصناف بنجر السكر في القطع الرئيسية وعدد الأيام حتى الحصاد في القطع الشقية وكانت أهم النتائج المتحصل عليها هي:

- تفوق الصنف حسام علي الصنفين سحر وكاوميرا في طول ووزن الجذر/نبات وحاصل الجذور/فدان ، بينما تحققت أعلي القيم لقطر الجذر وحاصل الأوراق في الموسمين ، ونسبة المواد الصلبة الذائبة الكلية في الموسم الأول بزراعة الصنف كاوميرا – في حين سجل الصنف سحر أعلي نسب للسكروز ، النقاوة و حاصل السكر/فدان في الموسمين ونسبة المواد الصلبة الذائبة الكلية في الموسم الثاني ، مقارنة بالصنفين الآخرين.
- دلت النتائج علي وجود فروقاً معنويةً بين مواعيد حصاد بنجر السكر ، حيث أدى تأخير الحصاد حتي عمر ٢١٠ يوماً إلى الحصول على أعلي القيم لكل الصفات المدروسة ما عدا وزن الأوراق الذي زاد بالتبكير في الحصاد عند١٨٠ يوماً من الزراعة.

تحت ظروف هذه الدراسة ، يمكن التوصية بزراعة أيٍ من صنفي بنجر السكر "حسام و سحر" وحصادهما عند عمر ٢١٠ يوماً للحصول علي أعلي حاصل من الجذور والسكر للفدان في الأراضى حديثة الإستصلاح فى محافظة سوهاج.