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Evaluation of some New Sugar Beet Varieties as Affected by Different Harvest Ages under Conditions of Minia Governorate

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ABSTRACT

Two field trials were conducted in 2016/2017 and 2017/2018 seasons at Mallawy Agric. Res., Station, (latitude of 28^{O} N, longitude of 30^{O} E and altitude of 49 m above sea level), El-Minia Governorate, Egypt, to study the effect of two harvest ages (180 and 210 days after sowing), on yield and quality of eight sugar beet varieties (Steel, Pyramide, Kosmas, Lammia, Belino, Amelie, Drena, and Beta 398). A randomized complete block design (RCBD) was used, in a split plot arrangement and replicated three times. The main-plots were devoted for harvest ages, while the evaluated sugar beet varieties were randomly sown in the sub plots, in both seasons. The results revealed that: 1. Harvest age exhibited a significant effect on all studied traits in both seasons. Beets harvested at older age (210 days after sowing) surpassed those harvested earlier (180 days after sowing) in all traits in both seasons, except loss in sugar yield/fed and α-amino- N%. 2. The tested sugar beet varieties varied significantly in all studied traits in both seasons. Beta 398variety recorded the best values of root, top, and sugar yields/ fed, in both seasons. The best values of sucrose %, loss in sugar/fed and sugar recovery % were obtained by Drena variety in both seasons. Lammia variety recorded the highest values of α-amino-N %, while the highest value of alkalinity coefficient was obtained by Kosmas variety, in both seasons. Planting Beta 398 sugar beet variety and harvesting it after180 or 210 days from sowing could be concluded get the highest productivity and quality of sugar beet under conditions of Minia Governorate.
Keywords: Harvest age, quality, sugar beet, varieties, yield.

INTRODUCTION

Sugar beet (*Beta vulgaris* var. *saccharifera*, L.) ranks the first important sugar crops in Egypt, producing about 57% of sugar production 2016/2017 season*.

In Egypt, it could be cultivated widely in newly reclaimed sandy soils at the northern or southern area of Egypt, without competition with other winter crops due to its tolerance to salinity and ability to produce high sugar yield under saline conditions and limited water requirements in comparison to the other traditional winter crops.

Plant age at harvest is one of the factors affecting yield and quality of sugar beet crop. Delaying harvest enhanced root yield, sugar and extractable sugar content, where Marlander (1992); Lauer (1995) and Brown (1997) reported that delaying sugar beet harvest till the end of autumn leads to decreases in sugar beet root and sugar yields, sucrose percentage and white sugar content. Jaggard and Scott (1999) suggested that later harvest dates for sugar beet result in greater sugar yield under no rainfall and cold weather. Kerr and Leaman (1997) showed that the yield was increased from the first till to last harvest date. Abo El-Magd, *et al. (*2003) and Shalaby, *et al*. (2011) found that delaying harvesting dates from 180 to 210 days from sowing significantly increased sucrose%, as well as root and sugar yields/fed in both seasons and significant decrease of Na, K and N%, harvest dates at 195 days after sowing gave the highest values. Aly (2006) showed that root and sugar yields/fed were positively increased by delaying harvest dates from 170, 190 to 210 days after sowing. On the contrary, early harvest date (170 day after sowing) gave the highest mean values of Na and K%. Azzazy, *et al*. (2007) and El-Sheikh, *et al*. (2009) harvested sugar beet varieties at 210 days after sowing and reported significant effect on root weight, sucrose%, impurities, *i.e.* Na% and K%, as well as root and sugar yields / fed, compared with beets harvested at 180 and/or 195 days after sowing. Mahmoud, *et al*. (2008), Yousef and Abdel-Mottaleb (2009) and Enan, *et al*. (2011) reported that the highest sucrose%, juice quality, as well as root and sugar yields/fed were obtained by increasing plant age at harvest from 180 up to 210 days after sowing. Klara, *et al*. (2017) indicated that in all trial seasons, root yield was significantly higher in the earlier drilled plots. On average, prolongation of the vegetation period in spring by 13 days increased root yield by 10.9%. Therefore, each day by which drilling is postponed represents a 0.7–0.8% loss of yield. As to sugar content, no statistically significant benefit of vegetation period prolongation by early drilling was found. Hanan and Yasin (2013) revealed that, delaying harvest date from 180 to 195 and 210 days significantly increased quality parameters, *i.e.* sucrose, purity and extractability percentages, as well as productivity traits (root and sugar yields) Al-Sayed, *et al.* (2012) found that delaying harvest date up to 210 days after sowing gave the highest root dimensions (length and diameter), root yield /fed, the best quality (sucrose%, and total soluble solids%)) and root and sugar yields compared with early harvest (at 180 days after sowing).

Sugar beet seeds sown in Egypt are imported and sugar beet varieties should be evaluated under the Egyptian conditions to select the best ones in respect to yield and quality traits. Aly (2006) found that Marathon variety had the best values of root fresh weight, as well as root and sugar yields/fed. He added that Kawimera variety was the highest one in sucrose%, extractable sugar and extractability percentages. Azzazy, *et al.* (2007), El-Sheikh, *et al.* (2009) and Enan, *et al.*(2009) found that sugar beet varieties differed significantly in all studied traits except TSS%. Farida variety was significantly higher in sugar yield, sucrose, while it recorded the lowest values of impurities (Na, K and N %). Mohamed, *et al.* (2012) showed that the differences between the studied sugar beet varieties were significant in root and sugar yields/fed, sucrose% and α-amino N. Abd El-Aal, *et al.* (2010) noticed significant variations in yield productivity and root quality among the tested

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sugar beet varieties. Kawemira and Gloria varieties gave the highest sugar yield followed by Nejma, while Lola exhibited the lowest sugar yield. Oscar poly, Carola, Raspoly, Kawemera and Mont Bianko were more responsive to the added nitrogen fertilizer. Similarly, Hanan and Yasin (2013) indicated that the evaluated sugar beet varieties significantly differed in all studied traits. Shalaby, *et al* (2011) reported that sugar beet varieties studied differed significantly for all traits *i.e.,* sucrose%, root and sugar yields (ton/fed), sodium% and potassium%. Al-Sayed, *et al.* (2012) found significant difference between sugar beet varieties in the studied traits, except total soluble solids %, Na content, α-amino N content and sugar lost to molasses.

The main objective of this experiment was to find out the response of some sugar beet varieties to plant age at harvest.

MATERIALS AND METHODS

Two field trials were conducted in 2016/2017 and 2017/2018 seasons at Mallawy Agricultural Research Station (latitude of 28^{O} N, longitude of 30^{O} E and altitude of 49 m above sea level), Agricultural Research Center, El- Minia Governorate, Middle Egypt, to study the effect of harvest ages (180 and 210 days after sowing) on yield, and quality of eight sugar beet varieties (Steel, Pyramide, Kosmas, Lammia, Belino, Amelie, Drena, and Beta 398). A randomized complete block design (RCBD) was used, in a split plot arrangement and replicated three times. The main-plots were devoted for harvest ages, while the evaluated sugar beet varieties were randomly sown in the sub plots. Each sub- plot consisted of 5 rows, 7 m in length and 0.6 cm in width. The area of each sub-plot was 21 m^2. The seeds were sown in hills of 20-cm apart on the 1st of October in both seasons. The preceding summer crop was maize (*Zea mays*, L.) in both seasons. Phosphorus fertilizer was added during seed bed preparation at the rate of 30 kg P_2O_5/fed as calcium super-phosphate 15 % P_2O_5. Plants were thinned to one plant per hill at 4-leaf stage. Nitrogen fertilizer was applied as urea (46.5 % N) at the rate of 80 kg N/fed, in two equal doses; after thinning and before the next irrigation. Potassium was added with the second nitrogen dose at the rate of 50 kg K_2O/fed as potassium sulfate (48% K_2O). The other cultural practices for growing sugar beet were done as recommended by the Ministry of Agriculture.

The recorded data:

The three guarded rows of each sub-plot were harvested, topped, cleaned and weighed in kg, which was thereafter converted into tons/fed to estimate root yield/fed (ton).

* Sucrose percentage (Pol. %) was determined using "Saccharometer" according to the procedure outlined by Le Docte (1927).
* Impurities content, *i.e.* α-amino-N%, Na% and K% were determined as meq /100 g beet according to A.O.A.C. (2005).
* Alkalinity coefficient was calculated according to the following equation:

Alkalinity coefficient = K + Na/ α-amino-N.

* Sugar recovery percentage was calculated according to the following formula:

Sugar recovery % = pol. % - [0.343 (Na + K) + 0.094 x α-amino-N + 0.29] According to Reinefeld, *et al*. (1974).

*Quality index (Q_z) was estimated using the following equation shown by Cooke and Scott (1993):

Q_z = Sugar recovery % x 100/ pol. %.

*Recoverable sugar yield/fed (ton) = root yield/fed (ton) x sugar recovery %.

*Loss of sugar to molasses% (LS %) = sucrose % - recoverable sugar %.

* Loss in sugar yield/fed (ton) = root yield/fed (ton) x loss sugar %.

Statistical analysis:

The recorded data were statistically analyzed according to technique of analysis of variance (ANOVA) by means of "MSTAT-C" software computer package according to the method described by Gomez and Gomez (1984) and least significant differences (LSD) test at 5% levels of probability was used to compare treatment means.

RESULTS AND DISUCSSION

I. Effect of harvest age on root yield and quality parameters:

Root yield/fed:

The results in Table (1) cleared that plant age at harvest had a significant effect on root yield/fed in the two seasons. Harvesting beets at 210 days resulted in 9.25 and 8.50 tons of roots/fed higher than those harvested earlier at age of 180 days, in the 1st and 2nd season, respectively. These obtained results may be due to the fact that, plants harvested at longer growth period after sowing, had the advantage to accumulated more assimilates resulted from the photosynthesis process to store more dry matter in their roots, in comparison with those harvested at younger age. These results are in line with those obtained by Yousef and Abdel-Mottaleb (2009) and Enan, *et al*. (2011).

Effect of harvest age on quality parameters:

Data in Table (1) cleared that all studied quality traits were significantly affected by beet age at harvest, in both seasons. Higher preferable commercial values of quality characteristics as Pol. (sucrose%), SR% (sugar recovery%) and QZ (quality index%) were obtained in sugar beet roots harvested later at age of 210 days, which also contained lower values of Na%, K%, LS% (loss of sugar to molasses%) and AC (alkalinity coefficient), as compared with beets harvested earlier after 180 days from sowing, in the first and second season. These results are in agreement with those obtained by Cakmakci (2002); Aly (2006); Hussein, *et al.* (2012); Awad, *et al.* (2014) and Klara, *et al.* (2017).

However, higher values of α-amino-N% and LS (the amount of sugar lost to molasses in ton/fed) were recorded in beets harvested at longer age.

Effect of harvest age on sugar yield parameters:

The results revealed that plant age at harvest affected significantly the studied sugar yield parameters in both seasons (Table 1).

Harvesting sugar beets after 210 days produced 1.56 and 1.49 ton of sugar yield/fed higher than those

harvested earlier at age of 180 days from sowing, in the 1st and 2nd seasons, successively. These findings were probably due to higher root yield and quality characteristics, in terms of sucrose and sugar recovery percentages recorded in case of delaying harvest to 210 days after sowing. However, the percentage and amount of sugar lost to molasses were higher at longer age. These results coincided with those reported by Mahmoud, *et al.* (2008); El-Sheikh, *et al.* (2009); Al-Sayed, *et al.* (2012); Hanan and Yasin (2013) and Awad, *et al.* (2014).

Table 1. Effect of harvest age on sugar beet yield and quality parameters at harvest in 2016/2017 and 2017/2018 seasons

Harvest ages	2016 /2017 season										
	RY	Pol.%	RSY	LS	SR%	LS%	impurities %			AC	Q_Z%
							K%	Na%	∞- amino-N%		
180 days	29.92	16.48	4.19	0.73	14.02	2.46	3.95	1.71	2.46	2.49	85.04
210 days	39.17	17.00	5.75	0.90	14.71	2.29	3.03	1.24	5.73	0.77	86.48
$LSD_{0.05}$	1.09	0.09	0.17	0.03	0.10	0.02	0.10	0.06	0.16	0.05	0.16
	2017 /2018 season										
180 days	29.83	16.47	4.35	0.73	14.58	2.46	2.89	1.31	1.61	3.01	88.54
210 days	38.33	16.96	5.84	0.88	15.26	2.28	1.95	0.84	4.87	0.60	89.94
$LSD_{0.05}$	0.50	0.04	0.08	0.01	0.04	0.01	0.02	0.01	0.06	0.27	0.06

RY= Root yield/fed (ton); RSY = Recoverable sugar yield/fed (ton); LS = Loss in sugar yield/fed (ton); SR% = Sugar recovery %; LS% = Loss in sugar yield %; AC= Alkalinity coefficient and QZ% = Quality index%.

II. Varietal differences in yield and quality:

Variation among varieties in root yield/fed:

Data in Table (2) indicated that the evaluated sugar beet varieties varied significantly in root yield/fed, in both seasons. Sugar beet variety Beta 398 produced the highest, while both of Amelie and Drena recorded the lowest root yield/fed, compared with the other varieties, in the 1st and 2nd seasons. Meanwhile, insignificant difference was found between Pyramid and Lammia varieties as well as among Kosmas, Drena and Amelie in root yield/fed, in the 1st season. The differences among sugar beet varieties under study could be due to the genetic make-up and their response to the environmental conditions. The differences among sugar beet varieties were found by Osman, *et al.* (2003); Azzazy, *et al.* (2007); El-Sheikh, *et al.* (2009); Enan, *et al.* (2009) and Abd El-Aal, *et al.* (2010).

Table 2. Varietal differences in sugar beet yields and quality parameters at harvest in 2016/2017 and 2017/2018 seasons

Sugar beet Varieties	2016 /2017 season										
	RY	Pol.%	RSY	LS	SR%	LS%	impurities %			AC	Q_Z%
							K%	Na%	α-amino-N %		
Steel	40.00	16.62	5.65	1.00	14.11	2.51	3.87	1.40	4.40	1.66	84.90
Pyramide	34.00	16.47	4.82	0.79	14.13	2.33	3.01	1.63	4.91	1.28	85.81
Kosmas	30.67	16.44	4.28	0.77	13.95	2.49	3.58	1.45	4.94	1.17	84.87
Lammia	34.00	16.17	4.76	0.78	13.87	2.31	3.56	1.48	3.10	1.87	85.54
Belino	36.67	16.91	5.39	0.82	14.69	2.22	3.75	1.02	3.10	2.34	86.86
Amelie	27.67	17.21	4.07	0.70	14.62	2.59	3.38	2.16	4.28	1.32	84.90
Drena	29.33	17.30	4.42	0.67	15.03	2.27	3.45	1.21	4.07	1.65	86.86
Beta 398	44.00	16.79	6.39	1.01	14.50	2.29	3.32	1.46	3.93	1.77	86.33
$LSD_{0.05}$	2.18	0.18	0.34	0.06	0.19	0.04	0.19	0.12	0.31	0.09	0.32
	2017 /2018 season										
Steel	40.50	16.65	5.96	1.02	14.72	2.51	2.81	1.02	3.50	1.88	88.40
Pyramide	33.00	16.42	4.85	0.76	14.68	2.32	1.93	1.21	4.07	1.27	89.36
Kosmas	30.33	16.41	4.41	0.74	14.55	2.44	2.46	1.04	3.92	1.16	88.67
Lammia	34.50	16.12	5.01	0.79	14.40	2.31	2.50	1.08	2.25	2.11	89.10
Belino	36.33	16.99	5.57	0.81	15.33	2.22	2.70	0.63	2.43	2.68	90.22
Amelie	26.83	17.13	4.08	0.67	15.11	2.59	2.31	1.76	3.49	1.22	88.22
Drena	28.67	17.18	4.44	0.66	15.48	2.27	2.42	0.81	3.21	1.96	90.12
Beta 398	42.50	16.81	6.43	0.97	15.11	2.28	2.25	1.04	3.07	2.14	89.86
$LSD_{0.05}$	1.00	0.08	0.16	0.02	0.08	0.02	0.04	0.02	0.12	0.54	0.12

RY= Root yield/fed (ton); RSY = Recoverable sugar yield/fed (ton); LS = Loss in sugar yield/fed (ton); SR% = Sugar recovery %; LS% = Loss in sugar yield %; AC= Alkalinity coefficient and QZ% = Quality index%.

Variation among varieties in quality parameters:

Data in Table (2) revealed that the evaluated sugar beet varieties varied significantly in quality parameters, in both seasons. Favorable pol.% was recorded by sugar beet variety Drena, without significant variance with Amelie, in the 1st and 2nd seasons. Moreover, Drena variety attained a significant superiority over the evaluated varieties in SR% in the 1st and 2nd seasons. Meantime, the lowest amount of sugar lost to molasses/fed was recorded by Drena, with insignificant difference with Amelie, in both seasons. However, sugar beet variety Belino recorded the best values of LS%, in both seasons. Its root also contained the lowest Na%, α-amino-N % (equally with Lammia) and QZ% (equally

with Drena), while, the lowest K% was given by Pyramide, in the 1st season. In the 2nd one, insignificant variance was detected between Plino variety, which had the highest QZ%, and Drena. Kosmas had the lowest AC in both seasons, without significant difference with Amelie, in the 2nd one. Variances among sugar beet varieties were also reported by Aly (2006); El-Sheikh, *et al.* (2009); Shalaby, *et al.* (2011) and Ragab and Rashed (2016).

Variation among varieties in sugar yield parameters:

Data in Table (2) showed that the evaluated sugar beet varieties varied significantly in sugar yield/fed, in both seasons. Beta 398 variety out-yielded the tested ones in the recoverable sugar yield/fed, in both seasons. Meanwhile, Steel and Blino ranked the 2nd and 3rd in RSY after Beta 398, successively in both seasons, without significant variance between them, in the 1st one. Differences among beet varieties in this trait were mentioned by Azzazy, *et al.* (2007); El-Sheikh, *et al.* (2009); Enan, *et al.* (2009); Abd El-Aal, *et al.* (2010); Awad, *et al.* (2013-a and b) and Ragab and Rashed (2016).

III. Effect of interaction between harvest age and sugar beet varieties on root yield and quality:

Effect of interaction on root yield:

Root yield was significantly influenced by the harvest date and sugar beet varieties interaction in both seasons as shown as in Table (3). It was found that the variance between Pyramide and Kosmas in RY was insignificant, when they were harvested at age of 180 days.

Table 3. Effect of interaction between harvest age and varieties on sugar beet yield and quality parameters at harvest2016/2017 and 2017/2018 seasons

interaction of harvest age x varieties		2016/2017 season										
		RY	Pol.%	RSY	LS	SR%	LS%	impurities %			AC	Q_Z%
								K%	Na%	α-amino-N %		
Harvest at age of 180 days	Steel	37.33	16.48	5.22	0.93	13.98	2.50	4.31	1.53	2.25	2.60	84.82
	Pyramide	26.67	16.37	3.72	0.64	13.95	2.42	3.63	1.83	2.69	2.03	85.23
	Kosmas	24.67	16.38	3.44	0.60	13.95	2.43	3.72	1.59	3.32	1.62	85.16
	Lammia	30.67	14.98	3.81	0.78	12.43	2.55	4.32	1.67	2.20	2.72	82.95
	Belino	32.67	16.82	4.79	0.71	14.64	2.18	4.08	1.05	1.36	3.77	87.05
	Amelie	23.33	17.13	3.27	0.72	14.03	3.10	3.98	3.10	4.04	1.75	81.87
	Drena	24.67	17.07	3.67	0.54	14.89	2.18	3.69	1.29	1.92	2.60	87.20
	Beta 398	39.33	16.62	5.62	0.91	14.30	2.32	3.82	1.59	1.90	2.84	86.63
Harvest at age of 210 days	Steel	42.67	16.77	6.08	1.07	14.25	2.52	3.44	1.27	6.56	0.72	84.98
	Pyramide	41.33	16.57	5.92	0.93	14.32	2.25	2.38	1.42	7.13	0.53	86.40
	Kosmas	36.67	16.50	5.12	0.93	13.96	2.54	3.44	1.31	6.57	0.72	84.59
	Lammia	37.33	17.37	5.72	0.77	15.31	2.06	2.80	1.29	3.99	1.02	88.13
	Belino	40.67	17.00	5.99	0.92	14.73	2.27	3.42	1.00	4.84	0.91	86.67
	Amelie	32.00	17.30	4.87	0.67	15.21	2.09	2.78	1.22	4.53	0.88	87.93
	Drena	34.00	17.53	5.16	0.80	15.17	2.36	3.21	1.12	6.22	0.70	86.53
	Beta 398	48.67	16.97	7.15	1.10	14.70	2.27	2.81	1.32	5.96	0.69	86.63
$LSD_{0.05}$		3.09	0.26	0.48	0.08	0.27	0.06	0.28	0.17	0.44	0.13	0.46
		2017 /2018 season										
Harvest at age of 180 days	Steel	38.67	16.52	5.64	0.97	14.59	2.51	3.26	1.14	1.38	3.19	88.31
	Pyramide	26.33	16.36	3.83	0.63	14.54	2.40	2.56	1.42	1.83	2.17	88.85
	Kosmas	24.33	16.37	3.54	0.58	14.56	2.39	2.67	1.19	2.17	1.77	88.91
	Lammia	31.33	14.92	4.05	0.80	12.94	2.55	3.26	1.28	1.34	3.38	86.75
	Belino	32.33	16.88	4.92	0.71	15.23	2.18	3.04	0.66	0.88	4.61	90.26
	Amelie	22.67	17.05	3.29	0.70	14.53	3.10	2.94	2.70	3.17	1.78	85.21
	Drena	24.33	16.98	3.74	0.53	15.38	2.18	2.65	0.90	1.05	3.37	90.55
	Beta 398	38.67	16.64	5.76	0.90	14.90	2.32	2.78	1.17	1.05	3.76	89.52
Harvest at age of 210 days	Steel	42.33	16.78	6.28	1.06	14.85	2.51	2.36	0.89	5.62	0.58	88.49
	Pyramide	39.67	16.48	5.88	0.89	14.81	2.25	1.29	1.00	6.30	0.36	89.87
	Kosmas	36.33	16.45	5.29	0.90	14.55	2.48	2.26	0.89	5.66	0.56	88.43
	Lammia	37.67	17.33	5.97	0.78	15.85	2.06	1.73	0.88	3.15	0.83	91.44
	Belino	40.33	17.10	6.22	0.91	15.42	2.26	2.37	0.60	3.98	0.75	90.17
	Amelie	31.00	17.20	4.87	0.65	15.69	2.08	1.69	0.82	3.80	0.66	91.24
	Drena	33.00	17.37	5.14	0.78	15.58	2.37	2.19	0.71	5.37	0.54	89.69
	Beta 398	46.33	16.98	7.10	1.04	15.32	2.24	1.72	0.90	5.09	0.51	90.19
$LSD_{0.05}$		1.42	0.11	0.22	0.03	0.12	0.02	0.06	0.02	0.17	0.77	0.17

RY= Root yield/fed (ton); RSY = Recoverable sugar yield/fed (ton); LS = Loss in sugar yield/fed (ton); SR% = Sugar recovery %; LS% = Loss in sugar yield %; AC= Alkalinity coefficient and QZ% = Quality index%.

However, at age of 210 days, Pyramide substantially surpassed Kosmas in this trait, in the 1st season. In the 2nd one, similar result was detected between Kosmas and Dreana at earlier harvesting at 180 days, with a marked superiority of Kosmas over Dreana in RY, at longer age. The results cleared that harvesting Beta 398

variety after 210 days produced the maximum root yield/fed compared with the other varieties, in both seasons. Similar results were reported by Shalaby, *et al.* (2011); Al-Sayed, *et al.*(2012) ; Awad, *et al*. (2014) and Klara, *et al* . (2017).

Effect of interaction on quality parameters:

Data in Table (3) indicated that interaction between harvest age and sugar beet varieties had a significant effect on quality parameters in both seasons. Later harvest age 210 days after sowing recorded higher preferable commercial values of quality characteristics as Pol.% with Drena variety with insignificant deference with Lammia in the 1st and 2nd seasons , SR% with Lammia with insignificant deference with Drena and Amelie in the 1st one, LS%and Q_Z with Lammia with insignificant deference with Amelie in the 1st and 2nd seasons, AC with Beta 398 with insignificant deference with Steel, Kosmas and Dreana the 1st one and with all evaluated varieties in the 2nd season , K% with Pyramide and Na% with Belino with insignificant deference with Dreana in the 1st season only as compared with earlier harvest age 180 days after sowing in the 1st and 2nd seasons. Meanwhile, earlier harvest age 180 days after sowing with Belino variety recorded the lowest values for α-amino-N % in both seasons with insignificant deference with Dreana and Beta 398 in the2nd season. The differences among sugar beet varieties under study with harvest age could be due to the variation in the gene make-up and their response to the environmental conditions. Some of the sugar beet genotypes have been promoted as high sugar content genotypes adapted for early harvest. Large genotype differences in crown tissue production (Halvorson, *et al.*, 1978 and Halvorson and Hartman, 1980) and development rate may cause quality differences between genotypes and thus require different harvest strategies. These results are in a harmony with those obtained by Shalaby, *et al.* (2011); Al-Sayed, *et al.* (2012), Hussein, *et al.*(2012), Hanan and Yasin(2013) and Awad, *et al.* (2014).

Effect of interaction on sugar yield parameters:

Regarding the effect of interaction between harvest age and sugar beet varieties on sugar yield parameters, it was found that all traits were differed significantly in both seasons as shown in Table (3). It was found that the variance between Pyramide and Kosmas; Kosmas and Lammia; Amelie and Dreana in RSY was insignificant, when they were harvested at age of 180 days. However, at age of 210 days, Pyramide surpassed all of these varieties in this trait, in the1st season. Harvested Beta 398 sugar beet variety after 210 days increased recoverable sugar yield/fed at 1.53 and 1.34 tons/fed, in the 1st and 2nd seasons, respectively. as well as, insignificant deferent between Belino and Amelie in LS when they were harvested at age of 180 days. However, at age of 210 days, Amelie surpassed Belino in this trait, in the 1st and 2nd seasons. while early harvest date 180days with Drena sugar beet variety decreased sugar lost to molasses at 0.26 and 0.25 tons/fed, in the 1st and 2nd seasons, respectively. These results are in the line with obtained by those Shalaby, *et al.* (2011), Al-Sayed, *et al.*(2012) , Hussein, *et al.*(2012) and Awad, *et al.* (2014).

REFERENCES

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

Abo-El Magd, B. M.; M. F. Ebraheim and KH. A. Aboushady (2003) Some chemical and technological carácteristics by planting methods and different harvest dates. J. Agric. Sci., Mansoura Univ., 28 (7): 5115-5128.

Abou-Salama, A.M. and S.I. El-Syiad(2000) Studies on some sugar beet cultivars under Middle Egypt conditions. I. Response to planting and harvest dates. Aust.J. Agric. Sci., 31(1): 137-159.

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

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

A.O.A.C. (2005) Association of official analytical chemists. "*Official Methods of Analysis*", 16th ed. International Washington, D.C., USA

Awad, N.M.M.; S.F.Tawfik and S.M.I. Moustafa (2013 a) Response of two sugar beet varieties to nitrogen and magnesium fertilization at nubaria aria J. Agric. Res .Kafr-Elsheikh Univ.,39(2):195-209.

Awad, N. M.M.; H.s. Gharib and S. M.I. Moustafa(2013 b) Response of sugar beet (Beta vulgaris L.) to potassium and sulphur supply in clayed soil at north delta, Egypt. Egypt. Agron. 35(1):77-99.

Awad, N. M.M.; A. Abdel-daiem and S.M.I. Moustafa (2014) Evaluation of siand sugar beet varieties under three harvest dates. Minufiya J. Agric.Res., 39 (1):121-130.

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 conditions. Egypt. J. Appl. Sci., 22 (12A):101-114.

Brown, S. (1997) Quality harvest program. Bri. Sugar Beet Rev., 65:12-3.

Cakmakci , R.(2002) Root yield and quality sugar beet in relation to sowing date , plant population and harvest date interactions. Turk. J. Agric. For., 26:133-136.

Carruthers, A.; J.F. Olld Field and H.J. Teague (1962) Assessment of beet quality. Paper presented to and vth. Ann. Conf . Br. Eng. Crop. P. 1-28.

Cook, D.A. and R.K. Scott (1993) The Sugar Beet Crops. Scientific. Practice. Publ. by Chapman and Hall, London.

Gomez,K.A. and A.A.Gomez (1984) Statistical Procedure for Agricultural Research. 2nd ed, John Wiley and Sons, New York, USA.

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

Enan, S.A.A.M; S.R.E.El-Sheikh and K.A.M.Khaled (2011) Evaluation of some sugar beet varieties under different levels of N and Mo fertilization. J. Biol. Chem. Environ. Sci. 4 (1): 345-362.

Halvorson, A.D. and G.P. Hartman (1980) Response of several sugar beet cultivars to N fertilization: Yield and crown tissue production. Agron. J. 72, 665-669.

Halvorson, A.D; G.P. Hartman ; D.F. Cole; V.A. Haby and D.E. Baldridge (1978) Effect of N fertilization on sugar beet crown tissue production and processing quality. Agron. J.70,876-880.

Hanan Y.M. and M.A.T.Yasin(2013) Response of some sugar beet varieties to harvest dates and foliar application of boron and zinc in sandy soils. Egypt. j. Agron. , 35(2):227-252.

.Harvey, G.W. and J.V.Dotton (1993) Root quality and processing .p_p. 571-617 In the Sugar-beet Crop Science into Practice, Edited by D. A. Cooke and Scatt published 1993 by Chapman &Hall.Edited by D. A. Isbn. 041225132.

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

Jaggard, K.W. and K. Scott (1999) The origins of yield improvement in the national sugar beet crop science 1970. Bri. Sugar Beet Rev.,67: 7-11.

Kerr, S. and M. Leaman(1997) To water or not. Bri. Sugar Beet Rev., 65: 11-3.

Klara, P.; C. Jaromir; P. Josef and U. Jaroslav (2017) Influence of sowing and harvest dates on production of two different cultivars of sugar beet. Plant Soil Environ., 63(2):76-81.

Lauer, J.G. (1995) Sugar beet performance and interactions with planting date, genotype and harvest date.Agron. J., 89:469-475.

Le Docte, A. (1927) Commercial determination of sugar in beet root using the Sacks. Le Docte process. Int. Sugar J. 29,488-492.

Mohamed, Kh. El-Sh; H.Y. Mohamed and E.M. Abdel Fatah (2012) Effect of nitrogen sources fertilization and boron foliar application on growth, quality and productivity of some sugar beet varieties. J. Biol. Chem. Environ. Sci., 7(4):177-192.

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

Marlander, B.(1992) Hoher Ertrag und hohe Qualitat - ein Widerspruch beim Anbau von ZuckerrYben Zuckerind, 117(11): 908-912.

Osman, A.M.H.; G.S. El-Sayed; M.S.H. Osman and K.S.El-Sogheir (2003) Soil application of some microelements with relation to yield and quality of sugar beet varieties. Annals of Agric. Sci., Moshtohor, 41 (3): 1071-1088.

Poschenok, (1976) Biochemical analysis of fruit and vegetable products.TataMc graw-Hill publishing company limited, New Delhi, pp: 634-650.

Ragab,Y. and S.H.Rashed(2016) Sugar beet yield and quality as affected by water regime before harvest, density and some cultivars in new reclaimed soils. j. of agric. Advanc. ,6(1):853-862.

Reinefeld, E; A. Emmerich; G. Baumgarten; C. Winner and U. Beiss (1974) Zurvoraussage des melassezukers aus rubenanalysen. Zuker, 27:2 15.

Shalaby, N. M. E., A. M. H. Osman and A. H. S. A. El-Labbody (2011) Evaluation of some sugar beet varieties as affected by harvest dates under newly reclaimed soil. Egypt. J. Agric. Res., 89 (2):605-614.

Yousef, M. S. H. and H. M. Abdel–Mottaleb (2009) Effect of sowing and harvest dates on productivity of some sugar beet varieties under Sinai conditions. J. Agric. Sci., Mansoura Univ., 34 (9):9543-9556.

تقييم بعض أصناف بنجر السكر الجديدة تحت تأثير عُمرى حصاد تحت ظروف محافظة المنيا

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أقيمت تجربتان حقليتان بالمزرعة البحثية - محطة البحوث الزراعية - ملوى - محافظة المنيا خلال موسمى الزراعة 2017/2016 و2018/2017 بغرض دراسة تأثيرعمرى حصاد (بعد 180 و 210 يوماً من الزراعة) على حاصل وصفات الجودة لثمانية أصناف من بنجر السكرهى: 1- ستيل ، 2- بيراميد ، 3- كوزماس ، 4- لميا ، 5- بيلينو ، 6- أميلى ، 7- درينا و8- بيتا398. نُفِذَت التجربتان فى تصميم القطاعات كاملة العشوائية فى ترتيب القطع المنشقة مرة واحدة فى ثلاث مكررات ، حيث خُصِّصت القطع الرئيسية لعمرى الحصاد ، بينما وزِّعت الأصناف فى القطع الشقية. أوضحت النتائج ما يلي: 1- أثَّر عمر النبات عند الحصاد معنوياً على كل الصفات المدروسة فى كلا الموسمين ، وتفوقت النباتات المحصودة مُتأخراً بعد 210 يوماً من الزراعة على تلك المحصودة مُبكراً بعد 180 يوماً من الزراعة فى كل الصفات محل الدراسة فى الموسمين ، عدا حاصل السكر المفقود/فدان ، ألفا أمينو نيتروجين ، حيث سُجِّلت قيماً أعلى فى النباتات المحصودة عند عمرٍ مبكر على 180 يوماً لهاتين الصفتين. 2- تباينت أصناف بنجر السكر المُختبرة معنوياً فى كل الصفات تحت الدراسة فى كلا الموسمين ، وأعطى الصنف بيتا 398 أفضل القيم لحاصلى الجذور والسكر المستخلص/فدان ، بينما تفوق الصنف درينا فى النسبة المئوية للسكروز ، وسجَّل قيماً أعلى لحاصل السكر المفقود/فدان والنسبة المئوية للسكروز - كما سجَّل الصنف لميا قيماً اعلى لمحتوى ألفا أمينو نيتروجين ، بينما سجَّل الصنف كوزموس أعلى القيم لمُعامل القلوية فى كلا الموسمين. تحت ظروف هذه الدراسة يمكن التوصية بزراعة صنف بنجر السكر بيتا 398 وحصاده عند عمر180 أو 210 يوماً من الزراعة للحصول على أعلى حاصلى جذور و سكر/فدان بمحافظة المنيا.