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Effect of Planting Date on Productivity of Some Sugar Beet Varieties under Kom Ombo Conditions.

Awadalla A.O.A.[1], Ahmed .S.M. Morsy[1], Sakina R. Abazid[2], Esraa, H.A. Abdel Karim [1]

[1-]Department of Agronomy, Faculty of Agriculture and Natural Resources, Aswan University, Aswan 81528, Egypt
[2-]Department of sugar crops technology, Sugar crops research institute, Agricultural research center

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Abstract

A field experiment was carried out at Kom-Ombo Agricultural research Station Farm, (latitude of 24° 28′ N and longitude of 32° 57′ E), Aswan Governorate, during 2019-2020 and 2020-2021 seasons to study the effect of sowing dates on growth, technological and yield traits of some sugar beet varieties under Kom Ombo conditions. Randomized complete lock design (RCBD) using a strip plot arrangement with three replications were used. Planting dates (30th September, October 15th and 30th October) were allocated horizontally while, sugar beet cultivars of multi-germ (Betamax, Cleopatra and Tarbelli) were allocated vertically. The results indicated that the tested planting date had a significant effect on root length (cm), root diameter (cm), root weight (kg), sucrose percentage, purity percentage, root and sugar yield in both seasons, as well as sodium percentage in the first season only. Furthermore, the tested sugar beet cultivars or varieties or genotype had a significant effect on most studied traits in both seasons. In additions, the interaction between planting date and sugar beet cultivars or varieties had a significant effect on sugar yield. Trait in the two seasons. Planted sugar beet cultivar Tarbelli on October 15 achieved the maximum average values of sugar yield. Which were 4.733 and 4.995 Ton/fad. In the first and second seasons, respectively. On the contrary, the minimum average values of sugar yield. Which were 1. 761 and 1.679 Ton/fad. Were recorded from planted sugar beet cultivar Betamax on September 30 in the two respective seasons

Keywords: sugar beet, planting date, cultivars, yield and its Quality, Aswan.

INTRODUCTION

Sugar beet (*Beta vulgaris* L.), in Egypt ranked the first in sugar production followed by sugar cane, where the total sugar production recorded 2.5 million ton in (2020-2021). Where sugar beet cultivation was extended to reach about feddan (**Sugar Crops Council, 2018**).

Corresponding author*: E-mail addresses: abdelmoniemomr@yahoo.com

The importance of sugar beet crop is not only from its ability to grow in wide range of soils (saline, alkaline and calcareous soils) but also sugar beet could be successful cultivated in the newly reclaimed soils, its ability to gained high root and sugar yields under stress conditions as well as its low requirement of water compared with sugar cane. There was a gap between sugar production and consumption due to steady increases in the population (2.5% annually) as well as the change of sugar consumption patterns. Increasing sugar beet cultivated area and sugar production per unit area are considered the important national target to minimize the gap between sugar production and consumption. This requires choosing the best sugar beet genotypes and planting those at the most appropriate dates and supplying them with their optimal water and nutrient needs to obtain the highest yield of white sugar. Sowing date is considered one of the most important factors directly affected on the yield, its components and juice quality. Determining of sowing on great extent on the prevailing climatic conditions and ecological environments could be expectation the reliable expression for the effect of Climatic conditions on growth and production. Sowing sugar beet at different dates would extend the supplying period of roots yield to sugar companies which guarantee extending working period, increasing production of sugar, eventually; it leads to minimizing the gap between sugar production and consumption. **Ilkaee *et al.* (2016)** showed that varying planting date significantly affected root sugar %. **Aly *et al*. (2017)** Found that sugar beet planted in October had higher values of root, fresh weigh/plant, root and sugar yields/fad, as well as the sucrose%, and impurities% compared with that sown on November. In general, both early and late sowing decreased sugar beet root, sugar and increased impurity contents **(Gobarah *et al*., 2019).** Also, **Lamani *et al.* (2019)** revealed that among of 12 different dates of sowing, higher yield and yield attributes were observed in sowing at October1st fortnight compared to the rest of the treatments

All sugar beet genotypes cultivated in Egypt are important from foreign countries, so it is preferable to evaluate them under the Egyptian conditions to select the superior genotypes in respect to sugar yield and quality traits Sugar beet varieties differed significantly in all studied traits **(Gobarah *et al*., 2019). El-Safy *et al.* (2021)** observed that five sugar beet varieties (Marwa kws, Sugar king, Mirage, Dreeman and Estora kws) Significant differences in , sugar yield, and sucrose % as well as purity % of sugar beet in both seasons. **El-Safy *et al.* (2020)** found that there sugar beet varieties (Classic, Farida and Gloriosa) was a significant difference between the three sugar beet varieties. Classic beet variety recorded the highest mean values of followed by Farida variety while the lowest ones recorded with Gloriosa variety in both seasons. **Ismail *et al.* (2006)** Inve that nine sugar beet genotypes under three sowing dates. They found that genotypes differed significantly in growth (length, diameter, and fresh root weight), yield (roots and sugar/fad) and quality characteristics in both seasons. The interaction between varieties and sowing dates had significant effect on root length, root and sugar yields/fad as well as sucrose%.

The objectives of this study are the study the impact of sowing dates on root yield and quality traits and select the optimum genotype that goes in line with both early and late sowing dates to obtain highest sugar yield and quality.

MATERIALS AND METHODS

1- Experimental site description:

The present work was conducted experiment farm al Kom Ombo research stows (latitude of 24° 28′ N and longitude of 32° 57′ E), Aswan Governorate, in the two growing seasons 2019/2020 and 2020/2021 to investigate the effect of sowing dates on growth,, technological and yield traits of some sugar beet varieties under Kom Ombo conditions.

2- Experimental treatments and design:

Randomized complete locks design (RCBD) using strip plot arrangement with three replications were used. Planting dates (30th September, October 15th and 30th October) were allocated horizontally while, sugar beet cultivars (Betamax, Cleopatra and Tarbelli) were allocated vertical.

3- Cultural practices:

Plot area was 21 m^2 containing six rows; the length of each row is seven meters, while row width was 5.0 meter. The meteorological data at Kom Ombo during the two seasons (from September to May in 2018/2019 and 2019/2020) were recorded.

Seeds of multi-germ sugar beet varieties were manually sown in hill on one side of the ridge at the rate of 2-4 seeds per hill. Thinning was done at four leaf stage (after 35 days from sowing) to ensure one plant/hill Fixed doses of phosphorus, nitrogen and Potassium fertilizers were applied at the recommended rates (30 kgs P_2O_5, 100 kgs N and 24 Kgs K_2O /fad. Respectively). The phosphorus was applied during land preparation as calcium super phosphate (15.5% P_2O_5). The nitrogen fertilization i.e. urea ($CO(NH_2)_2$) (46%) were splitted into two equal doses, the first application was added after thinning (at age of 40 days) and the second one was added after one month from the first dose. The potassium fertilizer was applied in the form of potassium sulphate, 48 % K_2O were splitted into two equal portions, which were given with the 1st and 2nd nitrogen fertilizers dose. All other agricultural practices were adopted as recommended for the sugar beet crop by Sugar Crops Research Institute.

Table (1): Temperature and relative humidity percentage in Kom Ombo region during (from September to May in 2019/2020 and 202/2021.

Season	2019/2020 season						2020/202١ season					
Months	Temperature °C			Humidity %			Temperature °C			Humidity %		
	Max	Min	Av.	Max	Min	Av.	Max	Min	Av.	Max	Min	Av.
September	39.8	١٩.8	29.5	٨٩	32	٦٠.5	٤٢.7	٢١.3	٣٢	82	٢٦	54
October	37.5	١٩.5	٢٨.5	81	٣٨	59.5	٣٩.5	١٨.1	٢٦.8	٨٢	٢٦	54
November	٣١.6	١٤	٢٢.8	٨٤	٣٢	٥٨	٢٨.2	١٠.3	١٩.25	88	27	٥٧.5
December	٢٤.7	7.2	١٥.9	94	٣١	67.5	٢٧.2	٢.4	١٤.8	٩٠	٢٥	٥٧.7
January	٢١.4	٥	١٣.2	٩٠	٣٠	٦٠	٢٥.7	٥.5	١٥.6	89	2٤	٥٦.5
February	٢٤.9	7.1	١٦	86	30	58	٢٦.6	٩	١٧.8	٧٣	٢٩	٥١
March	٣٠.9	١٢.3	21.6	٧٦	٢٦	٥١	٣١.6	12.8	٢٢.2	61	2٤	42.5
April	39.2	١٦	٢٧.6	65	26	45.5	٣٦.7	١٦.1	٢٦.4	٤٧	٢١	٣٤
May	٣٤.7	20.2	٢٧.4	٥٨	٢٥	٤١.5	٤١.8	٢٠.4	٣١.1	49	22	35.5

Source: Agricultural meteorological station in kom ambo sugar factory at Aswan.

4 – Measured traits:

After age of 210 days, sugar beet plants of the two guarded rows were up-rooted, topped, weighed and a random sample of five roots was taken from each sub- plot to determine:

Vegetative traits:

A.1- Root length (cm). A.2- Root diameter (cm). A.3- Root fresh weight (kg/plant)

B. Quality traits and impurities contents:

Plant samples were then sent to the laboratory of quality analyses at Fayoum Sugar Company to determine the following quality characteristics:

B.1- Sucrose percentage:

Sucrose percentage was estimated in fresh samples of sugar beet root using "Saccharometer"according to the method described by **A.O.A.C. (2012)**.

B.2- Purity percentage:

Purity percentage was calculated according to the following equation, described **by Devillers (1988)**:

Purity percentage = 99.36- [14.27 (Na + K + α-amino N)/ sucrose%]

B.C- roots and sugar yields traits:

IV.C.1- Root yield (tons/fad) **IV.C.2- Sugar yield (tons/fad)** was calculated as follows:

Sugar yield/fad. (ton) = [root yield/fad. (ton) x ES%].

. *5- Statistical analysis:*

The collected data were statistically analyzed according to **Snedecor and Cochran (1981).** Treatment means were compared using LSD at 5% level of probability.

RESULTS AND DISCUSSION

1- Vegetative growth traits:

Data illustrated in Table 2 reveal that the tested planting date had a significant effect on sugar beet root length trait in the two growing seasons. Planting sugar beet in mid of October resulted in an increase in root length in both seasons while delaying planting until the end of October or early until the end of September led to a reduction in root length in both seasons. Furthermore, the highest mean values of root length trait (29.89 and 31.11 cm in the two respective seasons) were obtained from planting sugar beer on 15 October in both seasons. This increase in root length might be attributed to the good weather condition that promoted photosynthesis and growth of sugar beet plants and hence increase root length. These findin**gs** are in a good trend with those detected by **El–Mansoub *et al.* (2020) and Khan *et al.* (2020).**

Moreover, the obtained data in the same previous table focus that the root length trait was affected significantly by studied sugar beet cultivars in the two seasons. The Tarbelli sugar beet genotype surpassed the others studied genotypes in this respect and gained the maximum mean values of root length (29.67 cm in both seasons) followed by Betamax genotype (26.89 and 27.89 cm) then Cleopatra genotype (24.44 and 24.78 cm in the first and second seasons, respectively. The difference among tested varieties in these traits might be attributed to the differences in genetic constituents for each variety and its response to the environmental

condition. Similar trend was observed by **Gobarah *et al*. (2019), Mubarak *et al.* (2020), Sorour *et al.* (2020) , El-Kady *et al.* (2021) and El-Safy *et al.* (2021).**

Here too, the exhibited data in Table (2) denote that the interaction between planting date and sugar beet cultivar had a significant effect on root length of sugar beet in both seasons. Sowing Betamax sugar beet genotypes on 15 October produced the highest mean values of root length trait (35.00 and 36.00 cm, while planting Cleopatra beet variety in same date gave the lowest values (22.00 and 22.33 cm**)** in the first and second seasons, respectively). Similar results were obtained **by Kaloi *et al*. (2014) and Gobarah *et al*. (2019).**

The illustrated data in the same table showed that the studied planting date had a significant effect on the root diameter of sugar beet in the two seasons. Planting sugar beet on 30 October in the first season or 15 October in the second one gained the highest mean values of root diameter trait (20.44 and 20.00 cm in the first and second seasons, respectively, without significant differences between them . This increase in root diameter might be attributed to the good weather condition that promoted photosynthesis and growth.

Moreover, the data reveal that the root diameter trait was affected significantly by the tested sugar beet cultivars in the two seasons. The planting of Betamax sugar beet cultivars gained the highest average values of root diameter trait cm in the two respective seasons. on the contrary, the lowest average values of this trait were recorded from sowing Tarbelli cultivar. These findings are in good line with those obtained by **Kandil *et al*. (2004); Leilah *et al*. (2005) and Gobarah *et al*. (2019).**Also data reveal that the root diameter trait was affected significantly by the tested sugar beet cultivars in the two growing seasons. Evaluated beet varieties differed significantly in root diameter in two seasons. The highest and the lowest mean values of this trait were recorded with Betamax and Tarbelli varieties respectively. This is may be due to the genetic behavior in combination with the environmental conditions which was suitable for Betamax cultivar than others studied sugar beet cultivars. These findings are in harmony with those obtained by **Gobarah & Mekki (2005), Enan *et al*. (2009), Shalaby *et al*. (2011), Mohamed & Yasin (2013), Masri & Hamza (2015) , Okasha & Mubarak (2018) ,Gobarah *et al*. (2019), Mubarak *et al.* (2020), Sorour *et al.*(2020) , El-Kady *et al.* (2021) and El-Safy *et al.* (2021).**

The illustrated data in the same Table showed that the studied planting date had a significant effect on the root diameter of sugar beet in the two seasons. Planting sugar beet on 30 October in the first season or 15 October in the second one gained the highest mean values of root diameter trait (20.44 and 20.00 cm)in the first and second seasons, respectively, without significant differences between them . This increase in root diameter might be attributed to the good weather condition that promoted photosynthesis and growth.

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respectively. This is may be due to the genetic behavior in combination with the environmental conditions which was suitable for Betamax cultivar than others studied sugar beet cultivars.

These findings are in harmony with those obtained by **Gobarah & Mekki (2005), Enan *et al*. (2009), Shalaby *et al*. (2011), Mohamed & Yasin (2013), Masri & Hamza (2015) , Okasha & Mubarak (2018) , Gobarah *et al*. (2019), Mubarak *et al.* (2020), Sorour *et al.*(2020) , El-Kady *et al.* (2021) and El-Safy *et al.* (2021).**

Also, data showed that the interaction had a significant effect on root diameter trait in the first season only, thus, the maximum average value of root diameter (21.67 cm) in the first season was recorded from planting Betamax cultivar on 15 October. Similar results were obtained **by Kaloi *et al*. (2014) and Gobarah *et al*. (2019).**

Results reveal that the tested planting date had a significant influence on root weight in the two seasons. The mid of October planting surpassed the in both seasons. the rate of increase was about 110.44 and 48.45% between the planting date on October 15 and the two planting dates September 30 and October 30, respectively in the first season being, 118.23 and 63.96 % in the second season in the same order. This is expected since the same trend was obtained considering the length and thickness of the root, the main component of weight. These results are in good line with those detected by **Kandil *et al*. (2004), Leilah *et al*.(2005) , Nikpanah *et al*.(2015) and Gobarah *et al*. (2019).** Moreover, the root weight traits reacted significantly to tested sugar beet genotypes in the two growing seasons Thus, the heaviest roots (5,171 and 5.009 kg in the first and second seasons, respectively) were recorded from Trabelli cultivar in both seasons. The rate of root weight gain of cultivar Trabelli compared to Cleopatra and Betamax was about 13.32 and 32.12 %, respectively in the first season being 7.12 and29.03% in the second season in the same order. A similar trend was observed by **Gobarah & Mekki (2005), Enan *et al*. (2009), Shalaby *et al*. (2011), Mohamed & Yasin (2013), Masri & Hamza (2015) , Okasha & Mubarak (2018) and Gobarah *et al*. (2019), Mubarak *et al.* (2020), Sorour *et al.*(2020) , El-Kady *et al.* (2021) and El-Safy *et al.* (2021).**The interaction had non- significant effect in this respect in the two growing seasons.

Table 2: Means of vegetative growth traits of sugar beet as affected by planting dates, Varieties and their interactions during 2019-2020 and 2010-2021 seasons.

Traits	Root length (cm)		Root diameter (cm)		Root fresh weight (kg/plant)	
	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21
Planting dates (D)						
30st September	24.33	24.22	17.00	15.89	3.019	3.006
15th October	29.89	31.11	19.99	20.20	6.353	6.560
30st October	26.78	27.00	20.44	19.33	4.277	4.001
LSD at 5%	**4.05**	**4.33**	**1.80**	**3.27**	**0.40**	**0.26**
Varieties (V)						
Betamex	26.89	27.89	20.67	20.44	3.914	3.882
Cleopatra	24.44	24.78	18.67	18.11	4.563	4.676
Tarbelli	29.67	29.67	17.33	16.67	5.171	5.009

LSD at 5%		**N.S**	**2.91**	**0.44**	**1.40**	**0.13**	**0.46**
Planting dates ×Varieties (D × V)							
30st September	**Betamex**	22.33	23.00	19.00	18.33	**2.537**	2.537
	Cleopatra	23.67	24.00	17.00	15.67	3.003	3.047
	Tarbelli	27.00	25.67	15.00	13.67	3.470	**3.433**
15th October	**Betamex**	35.00	36.00	21.67	22.67	**5.543**	5.760
	Cleopatra	22.00	22.33	19.00	19.33	6.313	6.787
	Tarbelli	32.67	35.00	17.00	18.00	**7.203**	**7.133**
30st October	**Betamex**	23.33	24.67	21.33	20.33	3.617	3.350
	Cleopatra	27.67	28.00	20.00	19.33	4.373	4.193
	Tarbelli	29.33	28.33	20.00	18.33	4.840	**4.460**
LSD at 5%		**٥.75**	**7.20**	**0.89**	**N.S**	**N.S**	**N.S**

2 - Quality traits and impurity contents:

Data exhibited in Table 3 showed that the sucrose % reacted significantly to the studied planting date in the two seasons. Thus, the maximum values of sucrose in sugar beet (17.588 and 18.417 % in the two respective seasons) were recorded from sugar beet plants which were planted on October 15 . This superiority in sucrose for the second planting date may be due to the appropriate weather conditions prevailing during the growth of the crop at this date to the increase in photosynthesis rates and the transformation of carbohydrates into sucrose as well as the high storage capacity in the roots.

Furthermore, the illustrated data reveal that the tested genotypes had a significant effect on sucrose % in both seasons. Tarbelli cultivar outperformed the rest of the cultivars under study in terms of sugar content , achieving the highest average values for this trait amounting to 17.050 and 17.486% for the two respective seasons. Cleopatra came in second place, while Betamax gave the lowest one. This result reassured that this trait is strongly correlated with gene make-up **(Ramadan and Nassar, 2004; Azzazy *et al*, 2007 ; Abd E-Aal *et a;* 2010 Enan *et al*., 2011).**

Concerning the interaction effect, it could be noted that the effect of the interaction between studied two factors on sucrose % was insignificant in both seasons .Data in same table cleared that purity% was significantly affected by planting dates in both seasons.The highest values (92.045 and 92.218%) were obtained from planted on October 15. in the first and second seasons, respectively

Results proved that tested sugar beet cultivars had a significant effect on the purity% in the two study seasons. Tarbelli cultivar outperformed the other two cultivars in this regard and gave the highest values 91.798 and 91.726% for the first and second seasons, respectively, while Cleopatra cultivar came in second place and Betamax ranked last in terms of juice purity. The differences between varieties might be attributed to the differences in genetic constituents for each variety and its response to the environmental condition. These results are in harmony with those obtained by **Gobarah & Mekki (2005), Enan et al. (2009), Shalaby et al. (2011),**

Mohamed & Yasin (2013), Masri & Hamza (2015), Okasha & Mubarak (2018) and Ghobarah et al. (2019).

The results also showed that purity % was significantly affected by the interaction between the studied factors in first season only. In general, the highest purity% (**92.503**) was obtained from Tarbelli variable, when it planted on October 15th.

Data tabulated in the table showed that Na percentage reacted significantly to the studied planting dates in the second season only. Thus, the lowest mean value of this trait (3.881% in the second season) was recorded when plants planted at September 30. These results are in harmony with those obtained by **Maralian et al. (2008), llkaee et al. (2016), and Gobarah et al. (2019)** came to similar results reporting that both early and later sowing dates decreased beet quality due to the effect of soil water content and temperature.

Data also showed that the examined varieties varied significantly in sodium percentage in the second season only. Thus, Betamax sugar beet cultivar recorded the minimum concentration of Na (3.780 %). The differences between varieties used in these traits might be attributed to the differences in genetic constituents for each variety. These results are in line with those obtained by **Gobarah & Mekki (2005), Enan *et al.* (2009), Shalaby *et al*. (2011), Mohamed & Yasin (2013), Masri & Hamza (2015) , Okasha & Mubarak (2018) and Gobarah et al. (2019).**

Data also clearly showed that the interaction between studied planting date and tested sugar beet genotypes had a markedly significant effect on sodium percentage in the two seasons. Generally, the lowest sodium % (3.730and 3.780%) were recorded by planting Tarbelli and Betamax varieties at October 30th and September 30th in first and second seasons respectively.

Table 3: Means of Quality traits and impurities contents of sugar beet as affected by planting dates, Varieties and their interactions during 2019-2020 and 2010-2021 seasons.

Traits		Sucrose percentage		Purity percentage		Sodium percentage	
		2019-20	2020-21	2019-20	2020-21	2019-20	2020-21
Planting dates (D)							
30st September		14.339	14.808	90.244	90.304	3.939	3.971
15th October		17.588	18.417	92.045	92.218	3.984	4.026
30st October		16.984	16.580	91.976	91.637	3.837	3.881
LSD at 5%		**1.36**	**0.61**	**0.61**	**0.27**	**0.08**	**N.S**
Varieties (V)							
Betamex		15.351	15.549	90.855	90.851	3.847	3.827
Cleopatra		16.510	16.770	91.614	91.582	3.967	4.052
Tarbelli		17.050	17.486	91.798	91.726	3.947	3.999
LSD at 5%		**0.45**	**0.45**	**0.36**	**0.48**	**N.S**	**0.11**
Planting dates × Varieties (D × V)							
D1	**V1**	13.337	13.727	89.543	89.828	3.830	**3.780**
	V2	14.663	15.053	90.678	90.755	3.940	3.957
	V3	15.017	15.643	90.513	90.328	4.047	4.177
D2	**V1**	16.893	17.263	91.469	91.504	3.980	3.913
	V2	17.740	18.597	92.164	92.390	4.050	4.180
	V3	18.130	19.390	**92.503**	92.761	3.923	3.983
D3	**V1**	15.823	15.657	91.552	91.220	**3.730**	3.787
	V2	17.127	16.660	91.999	91.601	3.910	4.020
	V3	18.003	17.423	92.377	92.089	3.870	3.837
LSD at 5%		**N.S**	**N.S**	**0.29**	**N.S**	**0.08**	**0.15**

3 - Root and sugar yields:

The data shown in Table 4 indicate the significant effect of the different planting dates on the roots yield in both seasons. Planting at October 15th recorded the highest mean values (28.607 and 27.736 Ton/fad.), whereas planting at September 30th recorded the lowest values(18.400 and 17.724 Ton/fad.) in the first and second seasons, respectively.

The increase in root yield might be attributed to the good weather conditions that promoted photosynthesis and improved growth of sugar beet and hence increase root dimension and weight accordingly increase root yield. These results are in harmony with the finding **of Nikpanah et al. (2010), Al-Jbawi et al. (2015), Nikpanah et al. (2015) and Ghobarah et al. (2019).**

Furthermore, data cleared that the tested sugar beet varieties had a significant effect on roots yield in the two seasons. The Tarbelli sugar beet variety surpassed the other two studied varieties and gained the highest values which were amounted by 25.106 and 25.156 Ton/fad. In the first and second seasons, respectively. This is to be expected since the same sugar beet cultivar i.e, Tarbelli gained the highest weight of root/plant as mentioned before in Table ٣ and consequently gained the maximum average of roots yield /fad**.** The differences among sugar beet varieties were obtained by **El-Sheikh et al. (2009), and Gobarah et al. (2019).**

The effect of the interaction between planting date and varieties was insignificant. data illustrated in Table 4 denote that the tested planting dates had a significant effect on sugar yield/fad. in the two seasons.

Planting at October 15th recorded the highest mean values (4.263 and 4.369 Ton/fad.), whereas planting at September 30th recorded the lowest values (2.147 and 2.904Ton/fad.) in the first and second seasons, respectively. This is to be logic since the same trend was obtained regarding root yield/fad. (Table 4) Traits as mentioned before these results are in a good line with those obtained by **Nikpanah et al. (2015), Al-Jbawi et al. (2015) and Ghobarah et al. (2019).**

Moreover, the exhibited data in Table ٤ show that the tested sugar beet cultivars had a significant effect on sugar yield in the two seasons. Thus, the maximum average values of sugar yield (3.656 and 3.777 ton/fad.) were recorded from Tarbelli variety. Otherwise, the lowest mean values (2.788 and 2.703 ton/fad) were detected from Betamax variety, in the first and second seasons, respectively. This is to be logic since the same trend was obtained regarding roots yield (Table 2) as mentioned before**.** These results are in line with those obtained by **Gobarah & Mekki (2005), Enan et al. (2009), Shalaby et al. (2011), Mohamed & Yasin (2013), Masri & Hamza (2015), Okasha & Mubarak (2018) and Gobarah et al. (2019).**

The results revealed that sugar yield was affected significantly by the interactions between planting dates with beet varieties on 1st season only. Planted sugar beet cultivar Tarbelli on October 15 achieved the maximum average values of sugar yield/fed. Which were 4.733 Ton/fad. On the contrary, the minimum average values of sugar yield,which were 1. 761., were recorded from planted sugar beet variety Betamax on September 30th in the first season. These results are in harmony with those recorded by **Kaloi et al. (2014), Hossain et al. (2015), Ilkaee et al. (2016,) Al-Jbawi (2015) and Gobarah et al. (2019).**

Table 4: Means of Root traits and sugar yields of sugar beet as affected by planting dates, Varieties and their interactions during 2019-2020 and 2010-2021 seasons.

Traits		Sugar yield (ton fed.$^{-1}$)		Root yield (ton fed.$^{-1}$)	
		2019-20	2020-21	2019-20	2020-21
Planting dates (D)					
30st September		2.147	2.094	18.400	17.274
15th October		4.263	4.369	28.607	27.736
30st October		3.349	3.337	23.309	23.957
LSD at 5%		**0.30**	**0.32**	**0.95**	**2.40**
Varieties (V)					
Betamex		2.788	2.703	21.610	20.673
Cleopatra		3.314	3.320	23.600	23.134
Tarbelli		3.656	3.777	25.106	25.159
LSD at 5%		**0.14**	**0.19**	**0.48**	**1.42**
Planting dates × Varieties (D × V)					
D1	**V1**	1.761	1.679	16.617	15.293
	V2	2.228	2.109	18.600	17.087
	V3	2.450	2.492	19.983	19.443
D2	**V1**	3.761	3.650	26.657	25.220
	V2	4.294	4.462	28.537	28.040
	V3	**4.733**	4.995	30.627	29.947
D3	**V1**	2.841	2.780	21.557	21.507
	V2	3.418	3.390	23.663	24.277
	V3	3.786	3.842	24.707	26.087
LSD at 5%		**0.13**	**N.S**	**N.S**	**N.S**

CONCLUSION

The researcher recommended throught his study by planting tarbelli sugar beet cultivar on October 15th to get the highest sugar yield /Fadden under the similar conditions.

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