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EFFECT OF SOWING DATES ON ROOT AND SUGAR YIELD OF SOME SUGAR BEET VARIETIES AT DIFFERENT LOCATIONS

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ABSTRACT

A field experiment was conducted to study the effect of two sowing dates (15 September and 15 October) on root and sugar yield of five sugar beet varieties (Melodia , Fantazia , Gambol , Jamika and Javlen) at three locations (Ismailia , Nubaria and Benisuef) during 2020/2021 and 2021/2022 seasons. The experiments were carried out in split plot design with three replications.

The obtained results indicated that Nubaria location exceeded Ismailia and Benisuef in root and sugar yield. Sowing plants at 15 September gave higher yields of root and sugar per feddan than sowing at 15 October. Sugar beet varieties significantly differed in root and sugar yield per feddan in both seasons. The interaction between locations, sowing dates and varieties was significant on root and sugar yield in both seasons. Sowing sugar beet variety Javlen at 15 September in Ismailia location gave the highest sugar yield, but at Nubaria location sowing sugar beet variety Melodia at 15 September gave the highest sugar yield in both seasons . While, at Benisuef location sowing sugar beet variety Gambol at 15 October gave the highest sugar yield as compared with all other this interaction treatments in both seasons.

Key Words: Sugar beet varieties, sowing date, locations, root and sugar yield.

INTRODUCTION

Sugar beet (***Beta vulgaris*, L**.) ranks the second important sugar crop after sugar cane, producing annually 45% of sugar production all over the world. Recently, sugar beet has an only in the fertile soils, but also in poor or saline or alkaline or calcareous soils. The great importance of sugar beet crop is not only from its ability to grow in the newly reclaimed areas as economic crop, but also for production higher of sugar under these conditions as compared with sugar cane. Moreover, sugar beet is specialized as a short duration crop, where it grows in a

period of about half that of sugar cane. Furthermore, sugar beet requires less water than sugar cane requirement. Also, its productivity makes it a good cash crop at this situation. The Egyptian Government encourages sugar beet growers to increase the cultivated area for decreasing the gap between sugar production and consumption. This increase is likely to be obtained by growing sugar beet crop in newly soils which presented in different locations in Egypt. Such locations as Ismailia, Nubaria and Benisuef considered as newly area for sugar beet production. Most of these areas face some stress problems, i.e. sowing date and unbalance nutrient elements. Attempts are made for increasing sugar beet productivity in these locations by sowing high yield sugar beet varieties with optimum sowing date at the different locations of Egypt. The production of sugar beet (*Beta vulgaris* L) is often limited by environmental conditions that cause decreased rates of photosynthesis, canopy expansion, root growth and sucrose accumulation **(Ober and Rajabi, 2010). Zhao *et al*., (2015)**, reported that climate change increased yields of the three winter crops and sugar beet in middle and northern regions (up to 36%), but decreased their yields in mediterranean countries (up to 81%)**.**

Sowing date is regarded as one of the most effective factors on yield and other traits of a crop **(Aliari *et al*., 2000).** Late sowing decreased sugar content, white sugar content and white sugar yield **(Durr and Boiffin, 1995). Naghizadeh *et al*. (2013)** showed the effect of sowing time on root yield, white sugar yield was significant and sugar content. Sowing in 23 September had the highest root yield (83 tha^{-1}), and white sugar (11.13 t ha^{-1}) yields in sugar beet. A delay in sowing results in losses of root weight, root yield and sugar yield but percentage of dry matter was significantly increased **(Kolble and Petzold, 2002; Sogut and Arioglu, 2004; Nikpanah *et al*., 2010; Al-Jbawi *et al*., 2015). Leilah *et al*. (2005)** concluded that sowing sugar beet on first of October produced the highest values of length, diameter and fresh weight of roots, purity percentage as well as root, top and sugar yields ha^{-1}. **Petkeviciene (2009)**, indicated that, one week delay in sowing reduced roots by 4.7 ton ha^{-1} and white sugar 0.9 ton ha^{-1}. **Gobarah, *et al* (2019)** sowing sugar beet plants at 1st October was signifcantly associated with the highest yields of root and sugar as well as quality traits**.**

Sugar beet genotypes can significantly differ in root yield and quality, which are the traits under high influence of environment. **El-Hennawy and El-Hawary (1995)** revealed that sugar beet varieties were

clearly differed of root and sugar (ton/fed) as well as sucrose percentage. **El-Sayed (1997)** there was a wide variation among sugar beet varieties in top, root, sugar yield (ton/fed) and sucrose percentage. **El-Hawary and Mokadem (1999)** reported that there was a magnitude variation among sugar beet varieties on all the studied characters in both seasons. Oscar poly sugar beet variety gave the highest yields of top, root and sugar than other two sugar beet varieties**.**. **Gobarah, *et al* (2019)**, showed that the variances due to sugar beet varieties were significantly in all studied traits. Ras-Poly variety recorded the highest values of root yield ton/fed, white sugar yield ton/fed and sucrose %.

The objective of this study was to determine influence of sowing dates on root and sugar yield of some sugar beet varieties at different locations.

MATERIALS AND METHODS

Two field experiments were conducted to study the effect of locations and sowing dates on yield of some sugar beet varieties during 2020/2021 and 2021/2022 seasons.

The experiment treatments were as follows:

I. locations

Three locations were used i.e.

1- Ismailia, 2-Nobaria and 3- Bniswef

II. Sowing dates

Two sowing dates were used as follows:

1- Sowing sugar beet plants at 15 September

2- Sowing sugar beet plants at 15 October

III. Sugar beet varieties

Five sugar beet varieties were studied as follows:

1-Melodia 2- Fantazja 3- Jampol 4- Jamajka 5- Javlin

The seeds of sugar beet were obtained from Sugar Crops Res. Inst., Agric. Res. Center, Giza, Egypt

The experiments were carried out in split plot design with three replications. The main plots were assigned to sowing dates and the sub plots were devoted to sugar beet varieties of each location and the combing analysis was made for the three locations. The area of sub plot was 10.5 m^2 (6 rows x 0.5 m width x 3.5 m length).

Soil samples were randomly taken from the experimental sites at depth of 0 to 30 cm from soil surface and were prepared for physical and chemical properties of each location and recorded as the mean of 2020/2021 and 2021/2022 seasons. Physical and chemical properties of

soil at the experimental sites as the mean of 2020/2021 and 2021/20202 seasons are shown in Table (1).

Table 1: Physical and chemical analysis of soil at the experimental site as the mean of 2020/2021 and 2021/2022 seasons.

Physical properties (%)	Ismilia	Nobaria	Bniswef
Sand %	60.8	27.8	22.2
Silt%	29.9	54.0	45.2
Clay %	9.3	18.2	32.6
Chemical properties (soulube ions (in 1:5 soil water extact)			
Ca^{+} (me^{-1})	3.90	3.90	4.10
Mg^{+}(me^{-1})	3.62	3.43	3.87
Na^{+}(me^{-1})	2.54	2.59	3.13
K^{+}(me^{-1})	0.34	0.32	0.37
CO_3^{-}(me^{-1})	-	-	-
HCO_3^{-}(me^{-1})	4.30	4.40	4.44
Cl^{-}(me^{-1})	4.70	4.35	4.89
CO_4(me^{-1})	1.50	1.45	2.3
EC (dSm^{-1}) in 1:5water extract	0.08	1.02	1.1
pH (in 1:2.5 Soil water suspenion extract)	8.10	8.13	8.17
$CaCo_3$ %	22.43	22.48	23.28

Weather data of Ismailia, Nubaria and Benisuef governorate of Egypt monthly at 2020/2021 and 2021/2022 seasons according to Egyptian Ministry of Agricultural and Land reclamation, Central lab. of Agricultural Climate, Agricultural Research Center are shown in Table 2.

Sowing took place on the studied sowing dates in 2020/2021 and 2021/2022 seasons, respectively. Seeds of fives sugar beet cultivars were hand sown in hills with approximately 3-4 seed balls/hill. Plants were thinned to one plants/hill after 35 days from sowing. All other cultural practices were done as recommended for sugar beet crop.

Data recorded:

At harvest time of the three locations all plants in each sub plot were harvested and the flowing data were measured:

1- **Root yield per feddan (ton).** It was determined by waiting all plants in the four rows and converted to feddan.

2- **Sucrose percentage in roots.** It determined in ten chosen roots from each sub plot by using Saccharometer.

3- Sugar yield per feddan (ton): It is calculated as the following formula: Percentage of sucrose X root yield/ feddan.

All data were statistically analyzed according to technique of analysis of variance (ANOVA) for the split-split plot design as mentioned by **Gomez and Gomez (1984)** by means of "MSTAT-C" computer software package and least significant differences revised (L.S.D.) at 5% level of probability was calculated for compare between treatments means.

Table 2: Weather data of Egypt-Bani Swaif-Ismailia-Nubaria-Monthly-2020-2021-2022

Months	First Season -2020-2021											
	Bani Swaif				Ismailia				Nubaria			
	Minimum air temperature [°C]	Maximum air temperature [°C]	Average relative humidity (%)	Precipitation (mm)	Minimum air temperature [°C]	Maximum air temperature [°C]	Average relative humidity (%)	Precipitation (mm)	Minimum air temperature [°C]	Maximum air temperature [°C]	Average relative humidity (%)	Precipitation (mm)
September-2020	22.52	38.60	40.75	0.00	22.17	38.72	54.19	0.00	23.32	34.45	64.85	0.00
October-2020	19.39	34.42	48.00	0.00	19.83	34.24	60.75	0.20	21.31	31.54	64.76	2.30
November-2020	13.57	25.03	60.07	5.50	14.68	26.05	63.15	11.80	17.69	23.94	67.64	51.30
December-2020	10.23	22.90	53.61	0.50	11.08	23.58	61.06	0.50	13.37	21.99	67.72	2.50
January-2021	7.84	22.02	52.36	0.60	9.16	22.16	61.95	3.40	11.81	20.56	70.01	15.10
February-2021	8.04	22.34	52.04	7.00	8.75	22.52	65.05	25.60	11.06	20.56	69.10	44.70
March-2021	9.70	25.11	49.57	21.00	9.55	24.06	63.14	51.90	11.71	20.71	67.85	192.00
April-2021	12.89	31.07	36.90	0.30	11.82	30.57	52.29	0.30	12.74	25.92	62.60	1.00
Average and sum	13.02	27.69	49.16	34.90	13.38	27.74	60.20	93.70	15.38	24.96	66.82	308.90

Table 2: Cont.

Months	First Season -2020-2021											
	Bani Swaif				Ismailia				Nubaria			
	Minimum air temperature [°C]	Maximum air temperature [°C]	Average relative humidity (%)	Precipitation (mm)	Minimum air temperature [°C]	Maximum air temperature [°C]	Average relative humidity (%)	Precipitation (mm)	Minimum air temperature [°C]	Maximum air temperature [°C]	Average relative humidity (%)	Precipitation (mm)
September-2021	20.83	35.58	45.03	0.10	21.45	36.77	52.66	1.10	23.17	32.71	61.16	1.70
October-2021	17.69	31.65	49.55	1.50	18.35	32.21	58.45	2.30	20.14	29.61	62.54	5.40
November-2021	14.94	28.41	52.67	0.90	16.00	28.62	64.09	11.20	17.53	26.63	67.05	25.80
December-2021	8.53	19.72	61.32	5.00	10.15	20.83	63.80	8.30	12.91	19.63	69.66	32.70
January-2022	4.50	16.71	64.10	9.40	6.23	17.57	68.17	30.00	9.20	16.66	71.30	72.10
February-2022	6.44	19.88	60.48	8.80	7.04	20.45	67.87	9.90	9.65	18.19	71.32	14.50
March-2022	7.06	22.00	51.86	49.10	7.36	21.78	61.32	13.30	9.84	18.93	67.50	61.10
April-2022	15.19	33.32	29.48	0.00	13.60	32.30	46.89	1.00	13.98	27.70	58.60	0.70
Average and sum	11.90	25.91	51.81	74.80	12.52	26.32	60.41	77.10	14.55	23.76	66.14	214.00

RESULTS AND DISCUSSION

Average sucrose percentage, root yield per feddan and sugar yield per feddan of some sugar beet varieties as affected by sowing dates at different locations in 2020/2021and 2021/2022 seasons are shown in Tables 3,4 and 5.

Results recorded in Tables 3,4 and 5 showed clearly that average root and sugar yields of some sugar beet varieties were significantly affected by different locations in both seasons, while sucrose percentage was significantly affected in the second season, only.

The obtained results indicated that Nubaria zone gave the highest values of root yield per feddan 47.18 and 47.46 ton as well as it gave the highest sugar yield per feddan 8.78 and 8.80 to. On the other hand, Benisuef location gave the lowest values of root yield per feddan 23.80 and 24.81 ton as well as sugar yield per feddan 4.23 and 4.48 ton as compared with other studied location in 2020/2021and 2021/2022 seasons, respectively. Also, it recorded higher sucrose percentage 18.53% compared to the other two studied location in the second season.

The superiority of Nubaria location in root and sugar yield per feddan may be attributed to it had adequate environmental for plant growth such as lowest temperature and highest relative humidity (Table 2) therefore recorded the highest root and sugar yield per feddan in both seasons. These results are in harmony with those obtained by **Ober & Rajabi (2010) and Zhao *et al*(2015).**

Results in Tables 3,4 and 5 showed clearly that sowing date had a significant effect on yields of root and sugar per feddan as well as had insignificant on sucrose percentage in both seasons. Sowing sugar beet plants on 15 September exceeded 15 October in root yield per feddan by 4.85 and 1.23 % as well as sugar yield per feddan by 3.37 and 4.54% location in 2020/2021and 2021/2022 seasons, respectively.

The increase in root and sugar yield per feddan due to 15 September may be attributed to it had the long growth period and it exposed to lowest temperature which decreased respiration rate and increased during translocate and stored net assimilation rate in roots. These results are in harmony with those obtained by **Nikpanah *et al*., 2010; Al-Jbawi *et al*., 2015** and **Gobarah, *et al* (2019)**.

The obtained results indicated that sugar beet varieties significantly differed in root and sugar yield in both seasons, but were significantly and insignificantly differed in sucrose percentage in 2020/2021 and 2021/2022 seasons, respectively. Sugar beet variety Javlen gave the highest values of root yield per feddan 36.48 ton in the first season as well as variety Fantazia gave the highest sugar yield per feddan 36.53 ton followed by Melodia 36.05 ton but the difference between them did reach to the significance in the second season. On the other hand, variety

Fantazia gave the lowest root yield per feddan 32.65 ton in the first season. While Jamika gave the lowest value of root yield per feddan 35.12 ton in the second season as compared with other studied varieties. According to sugar yield, sugar beet variety Melodia gave the highest sugar yield per feddan 6.61 and 6.65 ton as compared to all other studied varieties in 2020/2021 and 2021/2022 seasons respectively. On the contrary, variety Fantazia gave the lowest sugar yield per feddan 5.80 ton in the first season. While Jamika gave the lowest value of sugar yield per feddan 6.47 ton in the second season as compared with other studied varieties.

The superiority of variety Melodia in sugar yield per feddan may be attributed to it gave the highest root yield per feddan, thus it recorded the highest sugar yield per feddan. These results are in harmony with those obtained by **El-Hawary, (1999)** and **Gobarah, *et al* (2019)**

The obtained results illustrated that the interaction effect between locations and sowing date was insignificant on root yield per feddan in both seasons, but it was significant on sugar yield per feddan in both seasons, as well as it was significant and insignificant on sucrose percentage in the first and second seasons, respectively. Sowing sugar beet plants on 15 September at all locations surpassed sowing date 15 October of sugar yield per feddan in both seasons. Sowing sugar beet plants in Nubaria location on 15 September gave the highest sugar yield per feddan 9.06 and 9.01 ton, on the contrary, Sowing sugar beet plants in Benisuef location at 15 October gave the lowest sugar yield per feddan 4.12 and 4.26ton as compared with all other this interaction treatments in 2020/2021and 2021/2022 seasons, respectively.

The obtained results illustrated that the interaction effect between locations and sugar beet varieties were significant on root and sugar yield per feddan as well as sucrose percentage in both seasons. At Ismailia location variety Javlen gave the highest root yield per feddan 35.79 ton in the first season and Fantazia 35.76 ton in the second season. On the other hand, the lowest values of root yield was recorded by Jamika 31.60 and Gambol 35.21ton in 2020/2021and 2021/2022 seasons respectively.

At Nubaria sugar beet variety Melodia gave the highest root yield per feddan 51.52 and 50.63 ton treatments in 2020/2021and 2021/2022 seasons respectively. On the contrary, the lowest values of root yield per feddan were found with Fantazia 45.35 and Javlen 45.33ton in 2020/2021and 2021/2022 seasons, respectively.

At Benisuef location variety Fantazia gave the highest root yield per feddan 18.06 ton in the first season and Gambol 18.19 ton in the second season. On the other hand, the lowest values of root yield was found with variety Javlen17.46 and 17.89 ton in 2020/2021 and 2021/2022 seasons respectively.

Concerning sugar yield per feddan the highest values were recorded with variety Javlen 6.57 and 6.56 ton at Ismailia location and variety Melodia 10.18 and 9.80 ton at Nubaria location as well as variety Gambol 4.76 and 4.88ton at Benisuef location as compared with all other this interaction treatments in ton in 2020/2021and 2021/2022 seasons respectively.

The obtained results showed that the interaction effect between sowing date and sugar beet varieties were significant on root and sugar yield per feddan as well as sucrose percentage in both seasons. Sowing all sugar beet varieties used on 15 September exceeded 15 October in root yield per feddan by and sugar yield per feddan in both seasons. On 15 September sowing date sugar beet variety Melodia gave the highest root yield per feddan 37.30 ton in the first season and variety Fantazia 37.67ton in the second season. While the lowest values of root yielda were recorded with variety Fantazia 32.37ton in the first season and variety Melodia 35.22 ton when sown on 15 October as compared with all this interaction treatments. In this connection, on 15 September sowing date sugar beet variety Melodia gave the highest sugar yield per feddan 6.98 ton in the first season and variety Fantazia 6.95ton in the second season but the difference between variety Melodia and Fantazia did not reach to the level of significance in sugar yield in the second season, while the lowest values of sugar yield per feddan were recorded with variety Fantazia 5.81 and 6.21ton when sown on 15 October as compared with all this interaction treatments ton in 2020/2021 and 2021/2022 seasons, respectively.

The obtained results showed that the interaction effect between location, sowing date and sugar beet varieties was significant on root and sugar yield per feddan as well as sucrose percentage in both seasons. .At Ismailia location and 15 September sowing date variety Javlen gave the highest root yield per feddan 36.34 ton in the first season and Fantazia 37.01 ton in the second season but the difference among variety Javlen and Fantazia was insignificant. At Nubaria location sowing sugar beet variety Melodia on 15 September gave the highest root yield per feddan 54.74 and 50.13 ton in 2020/2021 and 2021/2022 seasons respectively. At Benisuef location sowing sugar beet variety Gambol on 15 October gave the highest root yield per feddan 28.54 and 28.00 ton as compared with all other this interaction treatments in 2020/2021 and 2021/2022 seasons respectively.

Table (3): Effect of locations and sowing dates on root yield (ton /feddan) of some sugar beet varieties in 2020/2021 and 2021/2022 seasons.

Locations	Sowing Date	2020/2021 Season						2021/2022 Season					
		Varieties					Mean	Varieties					Mean
		Melodia	Fantazia	Gambol	Jamika	Javlen		Melodia	Fantazia	Gambol	Jamika	Javlen	
Ismailia	15 Sep	34.41	33.07	35.32	32.84	36.34	34.40	32.72	37.01	34.21	34.71	36.33	35.00
	15 Oct	32.61	32.94	31.89	30.36	35.24	32.61	37.72	34.51	36.21	36.60	34.21	35.85
	Mean	33.51	33.00	33.60	31.60	35.79	33.50	35.22	35.76	35.21	35.65	35.27	35.42
Nubaria	15 Sep	54.74	45.43	48.03	45.84	48.81	48.57	53.75	50.13	44.39	45.71	45.47	47.89
	15 Oct	48.41	45.26	43.35	46.08	45.82	45.78	47.51	48.07	46.90	47.39	45.32	47.04
	Mean	51.57	45.35	45.69	45.96	47.31	47.18	50.63	49.10	45.65	46.55	45.39	47.46
Benisuef	15 Sep	22.85	20.25	25.15	26.23	25.46	23.99	24.17	25.88	25.69	23.93	27.68	25.47
	15 Oct	19.79	18.92	28.54	23.60	27.24	23.62	20.44	23.57	28.00	22.38	26.41	24.16
	Mean	21.32	19.58	26.85	24.91	26.35	23.80	22.30	24.73	26.84	23.16	27.04	24.81
General means of sowing dates	15 Sep	37.33	32.92	36.17	34.97	36.87	35.65	36.88	37.67	34.76	34.78	36.49	36.12
	15 Oct	33.60	32.37	34.59	33.35	36.10	34.00	35.22	35.38	37.04	35.46	35.31	35.68
General means		35.47	32.65	35.38	34.16	36.48	34.83	36.05	36.53	35.90	35.12	35.90	35.90

L.S.D at 5% level for :-		
Location (A)	**0.89**	**0.27**
Sowing date (B)	*	*
Variety (C)	**0.85**	**0.50**
A x B	**1.02**	**0.57**
A x C	**1.48**	**0.87**
B x C	**1.21**	**0.71**
A x B x C	**2.09**	**1.23**

Table (4): Effect of locations and sowing dates on sucrose percentage of some sugar beet varieties in 2020/2021 and 2021/2022 seasons.

Locations	Sowing Date	2020/2021 Season						2021/2022 Season					
		Varieties					Mean	Varieties					Mean
		Melodia	Fantazia	Gambol	Jamika	Javlen		Melodia	Fantazia	Gambol	Jamika	Javlen	
Ismailia	15 Sep	18.04	18.12	17.89	17.69	18.84	18.11	17.50	18.76	17.88	17.90	19.17	18.24
	15 Oct	17.18	16.95	18.53	19.19	17.87	17.94	17.38	16.90	18.02	18.82	18.00	17.83
	Mean	17.61	17.53	18.21	18.44	18.35	18.03	17.44	17.83	17.95	18.36	18.59	18.03
Nubaria	15 Sep	19.86	16.65	20.18	17.93	18.31	18.58	19.77	18.30	19.19	18.19	18.50	18.79
	15 Oct	19.59	18.99	16.65	20.66	16.83	18.55	18.90	18.10	17.39	19.21	17.71	18.26
	Mean	19.73	17.82	18.42	19.30	17.57	18.57	19.33	18.20	18.29	18.70	18.10	18.53
Benisuef	15 Sep	18.19	18.22	18.29	18.25	17.11	18.01	18.40	18.28	18.64	18.24	18.58	18.43
	15 Oct	17.36	17.90	17.27	17.21	17.81	17.51	17.81	17.68	17.74	17.80	17.19	17.64
	Mean	17.78	18.06	17.78	17.73	17.46	17.76	18.11	17.98	18.19	18.02	17.89	18.04
General means of sowing dates	15 Sep	18.70	17.66	18.79	17.96	18.09	18.23	18.56	18.45	18.57	18.11	18.75	18.49
	15 Oct	18.04	17.95	17.48	19.02	17.50	18.00	18.03	17.56	17.72	18.61	17.63	17.91
General means		18.37	17.80	18.14	18.49	17.89	18.32	18.29	18.01	18.48	18.69	18.19	18.33

L.S.D at 5% level for:-		
Location (A)	N.S	0.36
Sowing date (B)	N.S	N.S
Variety (C)	0.38	N.S
A x B	N.S	N.S
A x C	0.66	0.81
B x C	0.54	0.66
A x B x C	0.93	N.S

Table 5: Effect of locations and sowing dates on sugar yield (ton / feddan) of some sugar beet varieties in 2020/2021 and2021/2022 seasons.

Locations	Sowing Date	2020/2021 Season						2021/2022 Season					
		Varieties					Mean	Varieties					Mean
		Melodia	Fantazia	Gambol	Jamika	Javlen		Melodia	Fantazia	Gambol	Jamika	Javlen	
Ismailia	15 Sep	6.21	5.99	6.32	5.81	6.85	6.23	5.73	6.94	6.12	6.21	6.96	6.39
	15 Oct	5.60	5.58	5.91	5.83	6.30	5.84	6.56	5.83	6.53	6.89	6.16	6.39
	Mean	5.90	5.79	6.11	5.82	6.57	6.04	6.14	6.39	6.32	6.55	6.56	6.39
Nubaria	15 Sep	10.87	7.56	9.69	8.22	8.94	9.06	10.63	9.17	8.52	8.31	8.41	9.01
	15 Oct	9.48	8.59	7.22	9.52	7.71	8.51	8.98	8.70	8.16	9.10	8.03	8.59
	Mean	10.18	8.08	8.46	8.87	8.32	8.78	9.80	8.94	8.34	8.71	8.22	8.80
Benisuef	15 Sep	4.16	3.69	4.60	4.79	4.36	4.32	4.45	4.73	4.79	4.36	5.14	4.69
	15 Oct	3.44	3.39	4.93	4.06	4.85	4.13	3.64	4.17	4.97	3.98	4.54	4.26
	Mean	3.80	3.54	4.76	4.42	4.60	4.23	4.04	4.45	4.88	4.17	4.84	4.48
General means of sowing dates	15 Sep	6.98	5.81	6.80	6.28	6.67	6.51	6.84	6.95	6.45	6.30	6.84	6.68
	15 Oct	6.06	5.81	6.05	6.34	6.32	6.12	6.35	6.21	6.56	6.60	6.23	6.39
General means		6.61	5.80	6.44	6.36	6.50	6.34	6.65	6.59	6.51	6.47	6.54	6.55

L.S.D at 5% level for:-		
Location (A)	0.21	0.07
Sowing date (B)	*	*
Variety (C)	0.20	0.19
A x B	0.21	0.23
A x C	0.34	0.33
B x C	0.28	0.27
A x B x C	0.49	

According to sugar yield per feddan, sowing sugar beet variety Javlen on 15 September in Ismailia location gave the highest sugar yield per feddan 6.85 and 6.96 ton, but at Nubaria location sowing sugar beet variety Melodia on 15 September gave the highest sugar yield 10.87 and 10.63ton in 2020/2021 and 2021/2022 seasons, respectively. At Benisuef location sowing sugar beet variety Gambol on 15 October gave the highest sugar yield per feddan 4.93 and 4.97 ton as compared with all other this interaction treatments in 2020/2021 and 2021/2022 seasons, respectively.

Generally, I could be recommended that sowing sugar beet variety Javlen on 15 September in Ismailia location and variety Melodia at Nubaria location as well as at Benisuef location sowing sugar beet variety Gambol on 15 October gave the highest sugar beet yield per feddan.

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تاثير ميعاد الزراعة على انتاجية بعض اصناف بنجر السكر فى مناطق مختلفة

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اجريت تجربتان حقليتان لدراسة تاثر ميعادى الزراعة (15 سبتمبر و 15 اكتوبر) على محصول الجذور والسكر فى خمسة اصناف من بنجر السكر (ميلوديا و فانتازيا و جامبول و جاميكا وجافلين) فى ثلاثة مناطق مختلفة (الاسماعيلية و النوبارية وبنى سويف) فى موسمى 2020/ 2021 و 2021 / 2022 م .وصممت التجربة فى تصميم القطع المنشقة مرة واحدة فى ثلاث مكررات ثم عمل تحليل تجميعى للمناطق . وتتلخص اهم انتائج فيما يلى:

- اظهر النتائج اختلاف المناطق معنويا حيث تفوقت منطقة النوبارية فى محصول الجذور والسكر / فدان وسجلت اعلى محصول جذور47.46 و 47.18 طن / فدان ومحصول السكر 8.78 و 8.80 طن / فدان فى كلا موسمى الدراسة على التوالى.
- سجلت النتائج تفوق الزراعة فى 15 سبتمبر على 15 اكتوبر حيث اعطى زيادة فى محصول الجذور4.85 و 1.23 % ومحصول السكر 3.37 و 4.54 % فى كلا موسمى الدراسة على التوالى.
- اختلفت الاصناف معنويا فقد سجل الصنف ميلوديا وفانتازيا اعلى قيم لكلا من محصول الجذور والسكر مقارنة بباقى الاصناف المدروسة.
- اظهرت النتائج ان التفاعل بين المناطق ومواعيد الزراعة والتفاعل بين المناطق والاصناف وكذلك التفاعل بين مواعيد الزراعة والاصناف كان معنويا لمحصول الفدان من الجذور والسكر.
- كان تاثير التفاعل بين المناطق ومواعيد الزراعة والاصناف معنويا على محصول الجذور والسكر للفدان فى كلا موسمى الدراسة.
- عموما : توصى الدراسة بزراعة الصنف جافلين فى الاسماعيلية والصنف ميلوديا فى النوبارية فى 15 سبتمبر، بينما زراعة الصنف جامبول فى 15 اكتوبر ببنى سويف حيث سجلت اعلى القيم لمحصول الجذور والسكر للفدان .