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EFFECT OF SOWING DATES AND THINNING TIME ON YIELD AND QUALITY OF SOME MONOGERM AND MULTIGERM SUGAR BEET VARIETIES

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ABSTRACT

Two field experiments were conducted at Bani Sweeif governorate during 2002/2003 and 2003/2004 . The objective was to assess yield and quality relationships of six sugar beet varieties (3 monogerm and 3 multigerm varieties) in response to sowing dates and thinning time . Treatments consisted of three sowing dates (Sept. 10, Oct. 12 and Nov. 11) and three thinning time i.e., at 4, 6 and 8 true leaf stage.

The main results of this study revealed that sugar beet sown on September 10 gave significantly higher root performance in terms of length, diameter and weight, as well as root and sugar yields/fed. and root quality (Sucrose, Purity and recoverable sugar percentages), while, on the other hand delaying sowing date up to November 11 increased impurities such as Na, K and amino-N.

Early thinning at 4- leaf stage improved root characters, in terms of, length, diameter and weight and possessed superiority in roots and sugar production per fed. and improved beet quality in terms of sucrose and purity %.

Differences occurred among varieties in all traits under study .Multigerm varieties exhibited the highest root yield/fed. especially Oscar poly which ranked the first while, monogerm varieties surpassed multigerm ones in root quality as shown by Sofie variety. Worth to mention that the superiority of Sofie as monogerm variety with respect to sugar yield than the other multigerm ones may be due to that this variety distinguished with higher sugar content which partly compensated the reduction in root yield and this study must be economically evaluate. From both sugar factors and beet grower point of view.

The interaction between sowing date and variety marked effects on root and sugar yields in both seasons. The highest root yield was obtained when the variety Oscar poly planting at Sep. 10, on the other hand the highest sugar yields was obtained when the varieties Sofie and Oscar poly when planting at Sep. 10 in the first and second seasons, respectively.

INTRODUCTION

In Egypt, sowing sugar beet usually takes place during the period extended from Sept. to Nov. and the time of thinning of sugar beet plays an important on growth yield and quality of sugar. The objective of this study was to find out the optimum sowing date and time of thinning for six monogerm and multigerm sugar beet varieties to gave the optimum growth yield of roots and best quality of sugar.

Therefore, the proper date of planting to maximized root yield and better quality have been studied by many investigators . Srivastava and Singh (1981) in India, found that sugar beet sowing on Oct. 5 gave significantly higher root and sugar yields as well as root sugar content than those sowing on Oct. 20 or Nov. 20 Eraky *et al.* (1983) in Egypt, stated that early sowing of Sep. or Oct. gave the highest sucrose content as well as root and sugar yields. Similarly, El-Kassaby and Leilah (1992) and Badawi *et al.* (1995) in Egypt, found that sowing sugar beet during Oct. markedly increased root length, root diameter and root weight as well as root and sugar yields than sowing during Nov. Ramadan and Hassanin (1999) in Egypt, also found that sugar beet sown on Sept. 10 gave significantly higher root length and diameter, as well as root and recoverable sugar yields. Delay sowing date up to Nov. 10, intensified the reduction of sucrose, purity and recoverable sugar percentages but increased Na, K and amino-N. Enan (2004) showed that sowing sugar beet early on 15th Sep. significantly attain the highest values of root length, root diameter, root weight, sucrose % and purity %.

The optimum time of thinning appears to be practically important in determining yield and quality of sugar beet. Mahmoud (1979) found that delaying thinning from 2 to 4 pair leaf stage decreased length, diameter and weight as well as root and sugar yield/fed., while, sucrose and purity were not affected. Ramadan (1986) added that early thinning increased sucrose and purity percentage. Hassanin (1991) noticed that early thinning at 4- leaf stage improved root characters, in terms of, length, diameter and weight and possessed a superiority in roots and sugar production per fed. and improved beet quality in terms of sucrose and purity percentage.

It is now well established that among sugar beet genotypes root yield, gross sugar, sucrose percent and impurity indices related to inherent growth capabilities varied widely. Also, well established the wide variability among genotypes in response to environmental factors, especially sowing date and time of thinning . In this connection Mahmoud (1979) tested some sugar beet cultivars. Multigerm ones produced higher values for leaf area, length, diameter and weight of root, as well as yield of roots, sugar and sucrose content as compared to monogerm cultivars. Tripathi and Srivastava (1978) in India, tested sugar beet varieties at 8 locations. They stated that root yield ranged from 35.8 tons/ha. for Maribo Marina poly to 50.2 tons/ha. for the Maribo Magna poly, while, the highest sugar yields were recorded by Maribo Magna poly (8.9 tons/ha.), Nassar (1992) varietal differences have been detected in Na, K, amino-N and number of roots at harvest as well as root yield. Lauer (1997) stated that sowing date x

variety interaction was significantly affected Na, K and amino-N as well as root and recoverable sugar yields.

MATERIALS AND METHODS

Two field experiments were conducted during successive growing seasons of 2002/2003 and 2003/2004 under Bani Sweeif Governorate conditions. Fifty four treatments resulted from six sugar beet varieties [monogerm and multigerm (Table 1)], three sowing dates (Sept. 10, Oct. 12 and Nov. 11) and three thinning dates i.e., 4, 6 and 8 true leaf stage.

A split-split plot design with four replications was used in both seasons. Sowing dates occupied the main plots, thinning dates and varieties occupied the sub plots and sub-sup plots, respectively. The sub – sub plot size was 12.5 m^2, 5 rows 50 cm apart and 5 meters long, and 20 cm between hills, sowing was carried out manually using 2-3 seeds from both multigerm and monogerm varieties. Nitrogen was applied at the rate of 80 kg N/fed. In the form of urea (46.5 % N), splitted in two equal doses, the first dose was applied after thinning and the other dose was applied 30 days later . Moreover, 30 Kg of super phosphate (15 % P_2O_5) were added during land preparation and 24 Kg K_2O in the form of potassium sulphate (48 % K_2O) after seventy five days from thinning . All other cultural practices were carried out as recommended. The chemical and mechanical analysis of soil site are presented in Table (2).

Table (1): Varieties, classification (multigerm and monogerm) and their origin country.

No.	Variety	Classification	Country of origin
1	Oscar poly	Multigerm	Denmark
2	Ras poly		Swede
3	Toro		Germany
4	Sofie	Monogerm	Swede
5	Hilma		Swede
6	Marathon		Denmark

Table (2): Mechanical and chemical analysis of the experimental site.

Mechanical and chemical analysis	Seasons	
	2002-2003	2003-2004
Clay %	43.7	40.6
Silt %	26.3	29.7
Sand %	30.0	29.7
Organic matter %	2.2	1.9
Available N (p.p.m)	51	47
Available P (p.p.m)	10.1	8.3
Available K (p.p.m)	391	485
Ca Co_3 %	3.7	3.9
PH	7.5	7.4

The experiments were harvested at 210 and 208 days after sowing in the 1st and 2nd seasons, respectively. Samples of ten guarded roots and the three middle rows were used to determine the following traits:

1st- Root characters:

1- Root length and diameter (cm)
2- Root weight (g)

2nd- Quality traits

1- Sucrose percentage was determined using sacharimeter on basic lead acetate according to Carruthers and Oldfield (1960)
2- Juice purity percentage = Sucrose % x 100/T.S.S. According to Carruthers and Oldfield (1960)
3- Recoverable sugar percentage (corrected sugar) = [Pol - 0.343(K + Na) + 0.094 amino – N + 0.29] according to Reinfield *et al.* (1974),where, pol = Sucrose %,K = Potassium, Na = Sodium in milliequivalent/100 gm beet.
4- Sodium, Potassium and Amino- N (millequivalents/100 gm beet) were determined according to A.O.A.C. (1994).

3rd- Yield and yield contributing traits:

1- Number of roots at harvest
2- Root yield (ton/fed.)
3- Recoverable sugar yield (ton/fed) =root yield (ton/fed.)x recoverable sugar%

Data collected from both seasons were statistically analyzed according to Snedecor and Cochran (1967) .(Treatments means were compared by using LSD at 5 % level of probability according to Waller and Duncan (1969).

RESULTS AND DISCUSSION

A- Root characters:

1-Root length and diameter (cm)

Data presented in Table (3) indicated that early planting dates (Sep. and Oct.) were accompanied by a substantial increase in root length and diameter. Differences of planting dates were significant in both seasons. Such effect of early planting date may be attributed to the increase in the length of growing period and the suitable climatic conditions. Similar results were obtained by El-Kassaby and Leilah (1992), Badawi *et al.* (1995) and Enan (2004).

Thinning times exhibited significant effect on root characters i.e. length and diameter in both seasons. Thinning at 4-leaf stage maximized root length and diameter thereafter, delay in thinning was associated with a reduction in both root characters. These findings are in agreement with those obtained by Kamel *et al.* (1975) and Mahmoud (1979).

Varieties exhibited significant differences in root length and diameter. The heaviest roots were of Oscar poly variety with an average of 33.7 and 10.8 cm and 35.3, 11.1 cm for root length and diameter in first and second season, respectively. Meantime data in table (3) cleared that both traits of multigerm varieties surpassed those of monogerm ones in both seasons. The superiority of the multigerm varieties may be due to genetics deferences and hence may be due

to the increase in photosynthetic efficiency and more assimilates translocated from the leaves to the growing roots. These findings are in agreement with those obtained by Ramadan and Hassanin (1999) who showed that beet varieties differed in root length and diameter.

2-Root weight

Data in Table (3) show that root weight was significantly affected by sowing date. Delayed sowing date to Nov. decreased root weight by 16.4 and 20.5 % in both seasons, respectively as compared with Sept. sowing. These results are in the with those of Lauer (1997) and Enan (2004).

Thinning times exhibited significant effect on root weight in both seasons. Thinning at 4-leaf stage produced the heaviest roots in both seasons. These findings are in agreement with those obtained by Mahmoud (1979) and Hassanin (1991).

Root weight was significantly affected by varieties. The heaviest roots was obtained from Oscar poly (multigerm variety) with an average of 844 and 851g, in both seasons, respectively, while the lightest root 617 and 645g, resulted from Hilma (monogerm variety) in both seasons. The other varieties ranked in between. Oscar poly has the highest root length and diameter. These results are in agreement with those obtained by Fadel (2002).

B- Quality traits:

1- Sucrose and purity percentages

Sowing dates exhibited significant effects on sucrose and purity percentages in both seasons (Table 4). Delaying sowing date from Sep. to Nov. decreased sucrose % from 18.3 to 15.5 in the first season and from 18.9 to 16.0 % in the second season. and purity % from 88.8 to 86.6 % in the 1st season and from 89.1 to 87.4 % in the 2nd season. These findings are in agreement with those obtained by Eraky *et al.* (1983), Ramadan and Hassanin (1999) and Enan (2004).

Early thinning at 4-leaf stage significantly effected beet quality in terms of sucrose and purity %. Thinning at 4-leaf stage produced the highest sucrose and purity (17.5 and 88.5 %) and (17.9 and 88.9%) in the first and second seasons, respectively (Table 4). Similar findings were reported by Ramadan (1986)and Hassanin (1991) who stated that thinning times had significant effect on beet quality (sucrose and purity %).

Data in Table (4) revealed significant differences among varieties in sucrose and purity percentage in both seasons. Sofie (monogerm variety) recorded the highest sucrose 18.2 and 18.6 % and purity 88.9 and 89.3 % in both seasons, respectively. Whereas, the lowest sucrose and purity percentage resulted from Oscar poly (multigerm variety) in the 1st season and Ras poly (multigerm variety) in the 2nd season. The lowest sucrose and purity % of Oscar poly and Ras poly may be attributed to the increase in their individual root weight, as constituent for the reduction in sugar content. These results are in harmony with those obtained by Lauer (1997) and Ramadan and Hassanin (1999) .

Table (3): Length, Diameter and root weight as affected by sowing dates, thinning time and varieties .

Sowing date	2002/2003			2003/2004		
	Root length (cm)	Root diameter (cm)	Root weight (g)	Root length (cm)	Root diameter (cm)	Root weight (g)
10 Sept.	33.4	10.5	762	34.2	10.9	781
12 Oct.	29.2	8.4	689	30.1	9.0	715
11 Nov.	26.5	7.7	637	25.8	7.4	621
LSD at 0.05	2.6	0.6	43	3.0	0.9	36
Thinning time						
4- leaf	30.4	9.4	726	31.1	10.0	743
6- leaf	29.6	8.8	695	30.4	9.1	707
8- leaf	28.9	8.4	667	29.5	8.9	682
LSD at 0.05	0.6	0.3	26	0.4	0.4	22
Varieties						
Oscar poly	33.7	10.8	844	35.3	11.1	851
Ras poly	31.1	9.7	790	33.7	9.9	815
Toro	30.4	9.3	742	32.6	10.2	769
Sofie	29.3	8.6	773	31.8	9.9	781
Hilma	27.3	7.7	617	29.7	8.3	645
Marathon	26.4	7.1	704	28.8	8.2	750
LSD at 0.05	3.1	0.4	20	2.7	0.8	23

2- Recoverable sugar percentage

Sowing dates exhibited a significant effect on recoverable sugar % in both seasons. (Table 4). Delaying sowing date from Sept. to Nov. consistently decreased recoverable sugar % from 15.21 to 12.01 % and from 15.86 to 12.56 % in the first and second seasons, respectively. Such effect may be due the reduction in both root sucrose and purity percentages accompanied the delay in sowing (Table 4). These results are in line with those reviewed by Lauer (1997), Hassanin (1991) and Ramadan and Hassanin (1999) who found that planting dates exhibited a significant effect on recoverable sugar %, thereafter delaying planting date decreased this trait.

Early thinning at 4-leaf stage significantly affected recoverable sugar % in both seasons (Table 4). Thinning at 4-leaf stage produced the highest recoverable sugar % (14.36 and 14.81 %),while, thinning at 8-leaf stage produced the lowest recoverable sugar % (12.77 and 13.10 %) in the first and second season, respectively .

Recoverable sugar % was significantly affected by varieties in both seasons (Table 4). The highest recoverable sugar % were obtained from Sofie (monogerm variety) (15.28 and 15.76 %) as compared with the other varieties in the 1st and 2nd season, respectively . The superiority of Sofie variety may be has less impurities (Na, K and amino-N) than the other varieties and/or its highest content of sucrose and purity as mentioned before . These results are in line with those obtained by Lauer (1997), Hassanin (1991) and Ramadan and Hassanin (1999) who reported that recoverable sugar percentage was significantly affected by varieties .

Table (4): Sucrose, purity and recoverable sugar % as affected by sowing dates, thinning time and varieties.

Sowing date	2002/2003			2003/2004		
	Sucrose %	Purity %	Recoverable sugar %	Sucrose %	Purity %	Recoverable sugar %
10 Sept.	18.3	88.8	15.21	18.9	89.1	15.86
12 Oct.	17.1	87.6	13.76	17.6	88.2	14.31
11 Nov.	15.5	86.6	12.01	16.0	87.4	12.56
LSD at 0.05	0.8	0.7	1.70	0.5	0.5	1.31
Thinning time						
4- leaf	17.5	88.5	14.36	17.9	88.9	14.81
6- leaf	16.9	87.8	13.54	17.2	88.2	13.90
8- leaf	16.5	86.7	12.77	16.8	87.1	13.10
LSD at 0.05	0.3	0.6	0.47	0.2	0.4	0.51
Varieties						
Oscar poly	15.8	86.5	12.39	16.9	87.1	13.55
Ras poly	16.7	87.7	13.56	16.3	88.2	13.21
Toro	17.0	88.1	13.98	17.4	88.7	14.45
Sofie	18.2	88.9	15.28	18.6	89.3	15.76
Hilma	16.2	87.1	12.89	16.6	87.9	13.37
Marathon	17.9	87.6	14.69	18.2	88.1	15.09
LSD at 0.05	0.4	0.4	0.28	0.3	0.3	0.12

Variety x sowing date interaction produced significant effect in recoverable sugar % in both seasons, whereas Sofie variety gave the highest value (16.86 and 16.99 %) when sowing on Sep. 10 in the 1st and 2nd seasons, respectively (Table 7)

Variety x thinning time interaction did not exhibit significantly affected this trait in both seasons. (Table 8)

3- Impurities (Sodium, Potassium and amino-N

Differences among sowing date in Na, K and amino-N components were significant in both seasons (Table 5). Delaying sowing date up to Nov. 11 increased impurities components expressed as Na, K and amino-N contents in roots . Such effect may be explained the reduction in purity as mentioned before . These results are in line with those obtained by Lauer (1997) and Enan (2004).

Thinning at 4-leaf stage exhibited a significant effect on N, K and amino-N in both seasons. Thinning at 4-leaf stage produced the lowest impurities (1.72, 5.65 and 3.36) and (1.68, 5.59 and 3.27) in the 1st and 2nd seasons, respectively, while thinning at 8-leaf stage recorded the highest impurities (2.85, 6.20 and 3.64) and (2.77, 6.17 and 3.52) in the first and second seasons, respectively. Similar results were reported by Kamel *et al.* (1975).

Impurities significantly differed among the used varieties in both seasons. The highest impurities in terms of Na, K and amino-N were obtained from Oscar poly (multigerm variety), while the lowest impurities were obtained from Sofie (monogerm variety) in the 1st and 2nd season. These results may be

explained the superiority of the monogerm ones in the terms of sucrose, purity and recoverable sugar than the multigerm varieties. These results are in line with those obtained by Lauer (1997) and Ramadan and Hassanin (1999).

Table (5): Sodium, Potassium and amino – N as affected by sowing dates, thinning time and varieties .

Sowing date	2002/2003			2003/2004		
	Na	K	Amino –N	Na	K	Amino –N
	Meq./100 gm Beet					
10 Sept.	1.70	5.62	3.09	1.62	5.57	3.00
12 Oct.	1.93	6.00	3.50	1.88	5.92	3.43
11 Nov.	2.04	6.31	3.63	2.00	6.20	3.60
LSD at 0.05	0.06	0.25	0.07	0.03	0.33	0.04
Thinning time						
4- leaf	1.72	5.65	3.36	1.68	5.59	3.27
6- leaf	2.05	5.94	3.50	2.01	5.84	3.44
8- leaf	2.85	6.20	3.64	2.77	6.17	3.52
LSD at 0.05	0.30	0.22	0.09	0.27	0.20	0.11
Varieties						
Oscar poly	2.07	6.01	3.69	2.01	5.91	3.60
Ras poly	1.85	5.50	3.50	1.77	5.47	3.42
Toro	1.64	5.37	3.46	1.58	5.28	3.35
Sofie	1.57	5.18	3.34	1.48	5.09	3.28
Hilma	1.96	5.89	3.56	1.84	5.77	3.52
Marathon	1.88	5.70	3.39	1.80	5.56	3.27
LSD at 0.05	0.07	0.12	0.04	0.09	0.11	0.06

C- Yield and yield contributing traits:

1- Number of roots at harvest

Number of roots at harvest was significant affected by sowing date in both seasons (Table 6). It was clear from these results that delayed planting date up to Nov. 11 reduced No. of roots at harvest. Such reduction in No. of root accompanied late planting date might have been due to the inclement weather prevailins during Nov. sowing which affected negatively the final stand. as low temperature . These findings are in accordance with those obtained by Fadel (2002)

Thinning time insignificantly affected No. of roots at harvest in both seasons (Table 6).

The results in Table (6) also indicated that beet varieties had a significant effect on number of roots at harvest in both seasons. The highest number of roots fed. was obtained from Hilma (40.1 and 39.4) in the 1st and 2nd seasons, respectively. While the lowest No. of roots at harvest resulted from Marathon (34.2 and 35.1) in the 1st and 2nd seasons, respectively (both varieties were monogerm ones). The other varieties ranked in between. These results are in line with those obtained by Nassar (1992), Ramadan and Hassanin (1999) and Fadel (2002) who found that varieties differed in number of roots at harvest.

Table (6): Number of roots, root and sugar yields as affected by sowing dates, thinning time and varieties .

Sowing date	2002/2003			2003/2004		
	No. of root at harvest (1000)	Root Yield (tons/fed)	Sugar yield (tons/fed)	No. of root at harvest (1000)	Root yield (tons/ fed)	Sugar yield (tons/fed)
10 Sept.	38.7	29.5	4.49	39.5	30.8	4.88
12 Oct.	38.2	26.3	3.62	38.7	27.7	3.96
11 Nov.	37.6	24.0	2.88	37.8	25.3	3.17
LSD at 0.05	0.5	1.3	0.52	0.6	1.2	0.48
Thinning time						
4- leaf	38.0	27.6	3.96	38.2	28.4	4.21
6- leaf	39.2	27.2	3.68	39.3	27.8	3.88
8- leaf	39.8	26.5	3.38	40.1	27.3	3.68
LSD at 0.05	n.s	0.3	0.23	n.s	0.4	0.21
Varieties						
Oscar poly	35.4	29.9	3.70	36.0	30.6	4.15
Ras poly	35.6	28.1	3.81	35.5	28.9	3.82
Toro	36.9	27.4	3.83	36.7	28.2	4.07
Sofie	34.4	26.9	4.11	35.2	27.3	4.30
Hilma	40.1	24.7	3.18	39.4	25.4	3.40
Marathon	34.2	24.1	3.54	35.1	26.3	3.97

2-Root yields and recoverable sugar yields (ton/fed.)

Data in Table (6) revealed significant differences in root and recoverable sugar yields among planting date. Delayed planting decreased root yield by 18.6 and 17.9 % in the 1st and 2nd seasons, respectively, as well as reduced recoverable sugar yield by 35.9 and 35.0 in the 1st and 2nd seasons, respectively. Such effect may be due to the reduction on root weight, sucrose, purity and recoverable sugar percentages accompanied the delay in sowing . These results are in harmony with those obtained by Lauer (1997) who found that delay in emergence of 46 days decreased root yield 38 % and recoverable sugar yield 42 %.

Early thinning at 4-leaf stage out yielded significantly the other stage in root and recoverable sugar yields/ fed. in both seasons (Table 6). These findings are in agreement with those obtained by Ramadan (1986) and Hassanin (1991).

The root and recoverable sugar yields were significantly affected by varieties in both seasons (Table 6). Oscar poly (multigerm variety) gave the highest root yield (29.9 and 30.6 ton/fed.) in the 1st and 2nd season, respectively. Such result may be due to the increase in root weight (Table 3), while the variety Sofie (monogerm variety) gave the highest sugar yield (4.11 and 4.30 ton/fed.) in

the 1st and 2nd seasons, respectively. Such result may be due to the increase in sucrose and purity %, as well as a reduction in impurities than the other varieties (Table 4 and 5). The variation among sugar beet varieties in root and sugar yields were reported by Shalaby (1998) and Fadel (2002).

Worth to mention that, the superiority of Sofie as monogerm variety with respect to sugar yield than the other multigerm ones may be due to that this variety distinguished with higher sugar content which partly compensated the reduction in root yield and this study must be economically evaluate. From both sugar factory and beet grower point of view.

Planting date x variety interaction had a significant affected on root and sugar yields in both seasons (Table 7). The highest root yield was obtained when the variety Oscar poly planting at 10 Sep. (33.6 and 34.4 ton/fed.) in the first and second seasons, respectively, on the other hand the highest sugar yield was obtained when the varieties Sofie and Oscar poly planting at 10 Sep. (4.96 and 5.19 ton/fed.) in the 1st and 2nd seasons, respectively .

Interaction between varieties and thinning time had no significant affected on root and sugar yields in both seasons (Table 8).

Table (7): The interaction effect between varieties and sowing date on some traits during 2002/2003 and 2003/2004 seasons.

Varieties	Sowing date	2002/2003			2003/2004		
		Root yield (tons/fed)	Recoverable sugar %	Sugar yield (ton/fed)	Root yield (tons/fed)	Recoverable sugar %	Sugar yield (ton/fed)
Oscar poly	10 Sept.	33.6	13.86	4.66	34.4	15.09	5.19
	12 Oct.	29.0	12.76	3.69	30.0	13.81	4.14
	11 Nov.	27.0	10.57	2.85	27.8	11.75	3.27
Ras poly	10 Sept.	30.9	14.96	4.62	31.2	14.66	4.57
	12 Oct.	27.8	13.65	3.73	28.3	13.40	3.80
	11 Nov.	25.7	11.95	3.00	27.2	11.57	3.15
Toro	10 Sept.	30.0	15.58	4.67	30.3	15.51	4.70
	12 Oct.	27.1	13.88	3.70	28.3	14.21	4.02
	11 Nov.	25.2	12.46	3.04	26.0	13.64	3.55
Sofie	10 Sept.	29.4	16.86	4.96	30.1	16.99	5.11
	12 Oct.	26.2	15.09	3.95	26.9	15.52	4.17
	11 Nov.	24.6	13.46	3.31	24.9	14.77	3.68
Hilma	10 Sept.	27.3	14.08	4.84	28.9	14.47	4.18
	12 Oct.	24.5	13.20	3.23	26.2	13.32	3.49
	11 Nov.	22.4	11.21	2.51	21.1	12.32	2.61
Marathon	10 Sept.	26.5	15.90	4.21	28.1	16.42	4.61
	12 Oct.	23.6	14.89	3.51	25.9	15.09	3.91
	11 Nov.	22.0	13.05	2.87	24.7	13.76	3.40
L.S.D at 0.05 %		1.6	0.7	0.40	1.3	1.2	0.31

Table (8): The interaction between varieties and thinning time on some traits during 2002/2003 and 2003/2004 seasons.

Varieties	Thinning time	2002/2003			2003/2004		
		Root yield (tons/fed)	Recoverable sugar %	Sugar yield (ton/fed)	Root yield (tons/fed)	Recoverable sugar %	Sugar yield (ton/fed)
Oscar poly	4- leaf	30.6	13.13	3.95	31.3	14.21	4.45
	6- leaf	30.1	12.37	3.67	30.4	13.42	4.08
	8- leaf	29.8	11.93	3.49	30.1	13.02	3.91
Ras poly	4- leaf	28.6	13.99	4.00	29.2	13.77	4.03
	6- leaf	28.4	13.41	3.83	28.9	13.21	3.83
	8- leaf	28.0	12.83	3.59	28.6	12.65	3.62
Toro	4- leaf	28.0	14.59	4.09	28.9	15.02	4.34
	6- leaf	27.4	13.77	3.79	28.1	14.41	4.05
	8- leaf	27.1	13.06	3.54	27.6	13.91	3.84
Sofie	4- leaf	27.5	15.63	4.34	28.0	16.12	4.51
	6- leaf	26.9	15.06	4.13	27.1	15.67	4.25
	8- leaf	25.7	14.26	3.70	26.8	15.49	4.15
Hilma	4- leaf	25.8	13.50	3.54	26.2	13.91	3.64
	6- leaf	25.0	12.93	3.32	25.4	13.16	3.34
	8- leaf	23.0	12.48	2.93	24.6	13.04	3.21
Marathon	4- leaf	25.2	15.34	3.85	27.3	15.85	4.33
	6- leaf	24.0	14.60	3.50	26.0	14.97	3.89
	8- leaf	23.4	14.09	3.28	25.6	14.45	3.70
L.S.D at 0.05 %		n.s	n.s	n.s	n.s	n.s	n.s

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تأثير ميعادي الزراعة والخف على المحصول والجودة لبعض أصناف بنجر السكر وحيدة وعديدة الأجنة.

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أقيمت تجربتان حقليتان خلال موسمي ٢٠٠٢/٢٠٠٣ و ٢٠٠٣/٢٠٠٤ بمنطقة ناصر بمحافظة بنى سويف وذلك لدراسة تأثير العلاقة بين ميعادي الزراعة والخف على ستة أصناف من بنجر السكر ثلاثة منها عديدة الأجنة وهى أوسكر بولى و راس بولى و تورو والثلاثة الأخرى وحيدة الأجنة وهى صوفى و هيلما و مارثون وقد اشتملت الدراسة على ثلاث مواعيد للزراعة وهى ١٠ سبتمبر و١٢ أكتوبر و ١١ نوفمبر وثلاثة مواعيد للخف وهى على أعمار ٤ و ٦ و ٨ أوراق حقيقية.

أظهرت النتائج أن زراعة بنجر السكر في ١٠ سبتمبر أعطى أعلى مواصفات للجذر (طول وقطر و متوسط وزن للجذر الواحد وكذلك أعلى صفات جودة (السكروز والنقاوة والسكر المستخلص) وكذلك أعلى محصول من الجذور والسكر المستخلص بالطن للفدان وعلى الجانب الأخر أعطت الزراعة في ١١ نوفمبر أعلى نسبة من المواد الغير سكرية المتمثلة في الصوديوم والبوتاسيوم والامينو نيتروجين .

أدت عملية الخف المبكر على عمر أربعة أوراق حقيقية إلى تحسين صفات الجذر المتمثلة فى الطول والقطر والوزن وتفوق معنوي في المحصول من الجذور والسكر المستخلص من الفدان كما أدى الخف المبكر إلى تحسين صفات الجودة المتمثلة في النسبة المئوية لكل من السكروز والنقاوة.

اختلفت الأصناف تحت الدراسة معنويا حيث تفوقت الأصناف عديدة الأجنة في صفة محصول الجذور بالطن/ف وكان أعلاها محصولا هو الصنف أوسكر بولى بينما تفوقت الأصناف الوحيدة الأجنة في صفات الجودة وحقق الصنف صوفى أعلى صفات جودة و قد عادلت الزيادة في صفات الجودة في هذا الصنف الانخفاض في صفة محصول الجذور بالطن/ف محققا بذلك أعلى سكر مستخلص للفدان . وينصح باستكمال الدراسة بتقييم اقتصادي لزراعة كلا النوعين من البذور من وجهة نظر مزارعي بنجر السكر وشركات التصنيع .

التفاعل بين الأصناف وميعاد الزراعة كان معنويا لصفتي المحصول من الجذور والسكر المستخلص بالطن للفدان وعموما كانت أعلي قيمة من محصول الجذور أمكن الحصول عليها عند زراعة الصنف اوسكر بولى في ١٠ سبتمبر كما أن الزراعة في هذا الميعاد أدت إلى الحصول على أعلى محصول من السكر المستخلص للصنف صوفى والصنف أوسكر بولى في السنة الأولي والثانية على الترتيب.