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RESPONSE OF FOUR SUGAR BEET VARIETIES TO SEED TREATMENT AND WEED CONTROL METHODS UNDER GIZA CONDITIONS

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ABSTRACT

Two field experiments were carried out at Al-Ayat, Giza Governorate during 2012/2013 and 2013/2014 seasons to study the effect of seed treatments and weed control on yield and its components of four sugar beet varieties. The important results could be summarized as follow: Sugar beet varieties were significantly differed in root length in the 1st season, root diameter in the 2ndseason, root yield and sugar yield in both seasons. The highest root length (23.9 cm) and the highest values of root diameter (16 cm) were resulted from Farida sugar beet variety. While, the highest juice purity percentage (87.6%) and the highest sucrose percentage (19.8%) were resulted from Toro sugar beet variety (means of two seasons). Halawa variety attained the highest root and sugar yields (36.22 and 5.95 tons/fad.) respectively (means of two seasons). Regarding the influence of seed treatments, there were significant effects on root length in the 1st season and on sugar yield in the 2nd season. Concerning the effect of weed control, Goltex herbicide as a weed control recorded the best values of root length (21.2 cm), root diameter (15.1 cm), purity percentage (87.2 %), sucrose percentage (19.2 %) root and sugar yields (30.9 and 6.11 tons/fad.), respectively comparing with hand hoeing. Belong to the interaction effect between the studied factors; it was significant on root length and root yield in both seasons, purity percentage in the 1st season and sugar yield in the 2nd season. Using Goltex weed control method in combination with stimulated seed of Farida sugar beet variety attained the highest values of root length (25.3 cm) in the 1st season, root diameter (17.5 cm) and root yield (29.69 tons/fad.) in the 2nd season and sugar yield (7.62 and 5.95 tons/fad.) in both seasons respectively. In addition, using Goltex weed control method in combination with stimulated seed of Toro sugar beet variety attained the highest values of root length (21.4 cm) in the 2ndseason and purity percentage (91.8%) also sucrose percentage (20.9 %) in the 1st season.

Key words: Sugar beet varieties, seed treatment, weed control methods.

INTRODUCTION

Sugar beet (*Beta vulgaris*, L.) is considered the second producing sugar crop after sugar cane, producing annually 45% of sugar production. Recently, sugar beet has an important position in Egyptian crop rotation as a winter crop not only in the fertile soils, but also in poor, saline, 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. In addition, 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. The economic way of increasing sugar productivity could

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be achieved through developing appropriate new technology package that includes agronomic management to improve yield and quality of sugar beet such as varieties, seed treatment and weed control methods.

Many authors studied influence of sugar beet varieties on yield and its components. **El-Hennawy and El-Hawary (1995) and Bhullar *et al.* (2009)** revealed that sugar beet varieties were clearly differed of root and sugar yield (ton/fed) as well as sucrose percentage. **Al-Sayed (1997) and 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 values of relative water content. K/Na ratio, fresh root weight, relative root yield and yields of top, root and sugar than other two sugar beet varieties. Also, **Soomro *et al.* (2006); Siodmiak (2007); Ijoyah *et al.* (2008)** evaluated the yield performance of sugar beet varieties and they found that varieties were significantly differed. **Safina and Fatah (2011)** reported that sugar beet varieties differed significantly in all studied traits in 2008/ 2009 and 2009/2010 seasons except for sugar yield and purity % in 1st season only. **El-Hawary *et al.* (2013)** showed that sugar beet varieties significantly differed in root yield/faddan, sugar yield/fed., TSS% and sucrose % in both season, on other hand insignificantly differed in K%, Na% and amino nitrogen % in both season. Sugar beet variety Farida gave the highest value of root yield/fad., sugar yield/fad., TSS% and sucrose % compared to other varieties in both seasons

Seed treatments were tested in few articles, **Rajic and Milovac (2012)** used insecticides on sugar beet seed germination in field conditions and they noted that high positive correlation was determined between seed germination and sugar beet yield. Moreover, **Kandil *et al* (2014)** studied the effect of gibbrillic acid on seed germination behavior of sugar beet cultivars. they found that seed soaking in gibbrillic acid significantly affected final germination percentage, mean germination time, coefficient velocity, seedling vigor index, energy of germination, emergence rate and speed of germination.

As for weed control methods, **Jedruszczak (1990) and Derylo (1991)** evaluated 2 methods of weed control, mechanical and chemical by chloridazon at 5 kg/ha, on the development of weeds in sugar beet. The use of chloridazon delayed the germination of weeds also decreased the fruit and seed shedding of weeds before harvest of the cultivated crop. In addition, Chloridazon resulted in the greatest sugar beet root yields (48.5-85.2 t/ha) compared to mechanical weeding (47.4-81.5 t/ha). **Bondarchuk (1998)** showed that pre-emergence harrowing reduced weediness in sugar beet fields by up to 48.3% (1 harrowing) and 60.1% (2 harrowings) compared with the untreated control moreover, yields were 1.88 and 2.75 t/ha, respectively, compared with 1.57 t/ha in the untreated control. **El-Zouky (1998)** investigated the effect of 7-weed control methods on weed biomass and sugar beet yield. Chemical weed control alone was insufficient to control all weed species during the whole crop cycle. Chemical control + hand weeding at 100 days after sugar beet emergence resulted in increased yields. **Dotsenko (1999)** compared 6-weed control methods for sugar beet, the results showed that summer mowing of tall weeds reduced seed formation, improved conditions for sugar beet harvesting, and slightly increased sugar content and sugar beet yields. Mowing at a height of 15 cm should only be done 1-2 days before harvesting. However, repeated mowing of tall weeds in sugar beet fields leads to the natural selection of relatively low-growing and late-germinating weeds with high seed production, which are more resistant to herbicides. Therefore, **Seadh *et al.* (2013)**

evaluated four weed control treatments on sugar beet using (one hoeing, Goltix 70 WG, Goltix + one hoeing and two hoeing), showed that controlling weeds by two hand hoeing significantly recorded the highest values of root, top, purity percentage and sugar yields and its components per faddan in both seasons however, the highest percentages of TSS and sucrose were achieved from controlling weed by one hand hoeing in both seasons.

This investigation was conducted to study the effect of two seed treatments and two methods of weed control on yield and its components of four sugar beet varieties at Ayat, Giza Governorate.

MATERIALS AND METHODS

Two field experiments were conducted at Ayat, Giza Governorate during 2012/ 2013 and 2013/2014 seasons to study the effect of two seed treatments and two methods of weed control on yield and its components of four sugar beet varieties.

The experiments were carried out in split-split plot design with three replications. The varieties (Toro, Halawa, Farida, Hercule) were randomly distributed in main plots, seed treatments (control and Stimulate) were occupied in the sub-plot and weed control (Hoeing and chemical by Goltex which applied at 2l/fad. after planting and before irrigation) were allocated at random in sub-sub plots. Plot area was 21 m^2 (6 rows x 0.5 m width x 7 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 according to **Chpman and Pratt (1961).** Physical and chemical properties of the field experiment are shown in Table (1-a). The experiment soil was prepared as usually recommended. Potassium as potassium sulphate 48% K_2O as well as phosphorus as super phosphate 15.5% P_2O_5 were added at the rate of 100 kg fed^{-1} before planting for all plots . Then, Nitrogen fertilizer in form of ammonium nitrate 33.5% (80 kg fed^{-1}) was applied in two equal doses, the 1st dose was applied after thinning and the 2nd dose was carried out before the 3rd irrigation. Seeds were hand sown on the second week of October in both seasons. Plants were thinned to one plants/hill after 30 days from sowing. Other cultural practices were done as recommended by Sugar Crops Research Institute.

Data recorded:

Ten guarded plants were randomly chosen from each sub-plot to determine the following data:

1- Root length (cm)
2- Root diameter (cm)

At harvest the four guarded rows were uprooted, toped and weighted to determine:

3- Sucrose percentage: Determined by using sacchrometer set according to the methods of **A.O.A.C. (1980).**
4- Total soluble salts (T.S.S): was determined by the refract meter.
5- Juice purity percentage: was calculated as follows:

Juice purity %= {(Sucrose % x 100) / TSS}

6- Root yield per faddan was determined by harvest the four guarded row, topped and weighted.
7- Sugar yield per faddan (ton) was calculated according the following equation:

Sugar yield (ton/fad.) = Root yield (ton/fad.) × Sucrose (%)

Statistical Analysis:

Data collected were subjected to the statistical analysis according to the methods described by **Gomez and Gomez (1984).**

Table (1-a): Physical and chemical properties of the field experiment before sowing (0 - 30 cm depth) in the 1st season.

Soil property		
Particle size distribution		
	Sand %	15.16
	Silt %	49.38
	Caly %	36.46
Texture class		**Clay**
CaCO3 %		0.6
Chemical analysis		
E.C (1:5 extract) dS/m		0.9
pH (1:2.5 susp.)		7.3
Soluble cation (meq/L)		
	Ca++	3.4
	Mg++	1.26
	Na+	0.8
	K+	0.6
Soluble anion (meq/L)		
	$CO^{=}_3$	-----
	HCO^{-}_3	3.78
	Cl-	1.12
	$SO^{=}_4$	1.16
P (ppm)		22
K (ppm)		412
N %		5000

Table (1-b): Data of climatology temperature elements that taken for the period of 2012/2013 – 2013/2014 by Central Laboratory Agricultural Climate.

Year 2012/2013	Temperature C°		Year 2013/2014	Temperature C°	
	Min.	Max.		Min.	Max.
September	22.6	34.5	**September**	23.4	35.8
October	20.3	32.8	**October**	21.5	33.8
November	14	25.4	**November**	17.1	28.6
December	12	23.2	**December**	12.1	23.6
January	10.9	22.5	**January**	9.7	21.2
February	11.5	25	**February**	11.3	22.9
March	13.9	27.1	**March**	11.9	24.8
April	16	29.6	**April**	18.5	28.4
May	19.2	33.9	**May**	18.7	32.8

RESULTS AND DISCUSSION

The following discussion will include the effect of main factors on the studied characteristics. Moreover, because root yield is the final product for the growers and sugar is the final product for sugar factory, the interaction study will mean by the interaction between the studied factors on root and sugar yields only.

1. Root length (cm):

Data in Table (2) and Fig. (1) show the effect of weed control (hand hoing - chemical by Goltex), seed treatment (control - stimulated) and four sugar beet varieties (Toro - Farida - Hercule -Halawa) as well as their interaction on root length (cm).

Given results revealed that root length significantly affected by the studied varieties in the 1st season. The highest root length (23.9 cm) was resulted from Farida variety while in the 2nd season varietal differences were not great enough to be significance. This result is in agreement with those obtained by **El-Hawary and Mokadem (1999)**. The effect of seed treatments on root length was significant in the 1st season that gave the highest root length (23.1 cm) by control treatment (non stimulated seeds) also it gave the highest root length (19.3 cm) in the 2nd season but without significance. This result is in line with that reported by **Hilal (2000)** and **Aly *et al.* (2009)**. Regarding the effect of weed control methods on root length, the differences were significant in the 2nd season while in the 1st season the differences were not great enough to be significance. Chemical weed control method by Goltex recorded the highest values of root length.

As for, the effect of interactions on root length, the interaction between varieties and seed treatments also the interaction between varieties, seed treatments and weed control methods were significant in both seasons. using Goltex weed control method in combination with stimulated seed of Farida sugar beet variety attained the highest root length (25.3 cm) in the 1st season also using Goltex weed control method in combination with stimulated seed of Toro sugar beet variety attained the highest root length (21.4 cm) in the 2nd season. Moreover, the interaction between varieties and weed control methods was significant in the 1st season. While the interaction between seed treatments and weed control methods was not significant in both seasons.

2. Root diameter (cm):

Data collected in Table (3) and illustrated Fig. (1) reveal the variation of root diameter (cm) among sugar beet varieties as well as the effect of weed control and seed treatments. Sugar beet varieties significantly differed in root diameter in the 2nd season, Farida variety attained the highest root diameter (16 cm) in the second season. This result is in line with that reported by **El-Hawary and Mokadem (1999).** Regard to the influence of seed treatments, it had no statistical effect on root diameter in both seasons and the differences were not great enough to be significance. This finding was true in the two seasons. The effect of weed control methods on root diameter was significant in both seasons. The highest root diameter (14.8 and 15.5 cm) resulted from chemical treatment using Goltex in two seasons respectively. These results are in coincide with those deduced by **Abd El-Aal (2001)** and **El-Geddawy *et al.* (2001)**.

The available data in Table (3) revealed that none of the various combination between the studied factors had a significant influence on the values of root diameter in both growing seasons except the interaction between studied varieties and seed treatments in the 2nd season that gave a significant effect and recorded (17.0 cm) root diameter by using stimulated seeds of Farida sugar beet variety.

Table (2): Root length (cm) of four sugar beet varieties as affected by seed treatments and weed control methods.

		Weed control (W) 2012/ 2013			Weed control (W) 2013/ 2014		
Varieties (V)	**Seed treatments (S)**	**Hand hoing**	**Goltex**	**Mean**	**Hand hoing**	**Goltex**	**Mean**
Toro	**Control**	21.2	23.7	22.4	18.1	20.5	19.3
	Stimulated	20.9	23.6	22.3	17.9	21.4	19.6
Mean		21.0	23.6	**22.3**	18.0	21.0	**19.5**
Farida	**Control**	22.0	24.7	23.4	19.3	18.7	19.0
	Stimulated	23.6	25.3	24.5	17.1	19.1	18.1
Mean		22.8	25.0	**23.9**	18.2	18.9	**18.6**
Hercule	**Control**	24.4	24.4	24.4	18.2	20.3	19.3
	Stimulated	23.8	19.9	21.9	19.5	18.8	19.2
Mean		24.0	22.2	**23.1**	18.9	19.6	**19.2**
Halawa	**Control**	23.6	21.1	22.3	19.1	19.8	19.5
	Stimulated	19.6	20.2	19.9	19.3	17.8	18.6
Mean		21.6	20.7	**21.1**	19.2	18.8	**19.0**
Weed control (W)	**Control**	22.8	23.5	**23.1**	18.7	19.9	**19.3**
	Stimulated	22.0	22.3	**22.1**	18.5	19.3	**18.9**
Mean		**22.4**	**22.9**		**18.6**	**19.6**	
L.S.D at 0.05							
V				0.8			***NS***
S				0.7			***NS***
W				***NS***			0.6
Vx S				1.3			1.3
V x W				1.2			***NS***
S x W				***NS***			***NS***
V x S x W				1.7			1.7

Table (3): Root diameter (cm) of four sugar beet varieties as affected by seed treatments and weed control methods.

		Weed control (W) 2012/ 2013			Weed control (W) 2013/ 2014		
Varieties (V)	Seed treatments (S)	Hand hoing	Goltex	Mean	Hand hoing	Goltex	Mean
Toro	Control	13.8	14.4	14.1	14.7	16.6	15.7
	Stimulate	12.5	15.1	13.8	11.0	15.6	13.3
Mean		13.1	14.8	13.9	12.9	16.1	14.5
Farida	Control	13.7	15.0	14.4	14.2	15.8	15.0
	Stimulate	13.0	13.4	13.2	16.4	17.5	17.0
Mean		13.4	14.2	13.8	15.3	16.7	16.0
Hercule	Control	14.8	14.6	15.2	13.0	15.3	14.1
	Stimulate	14.2	14.3	14.2	13.8	14.9	14.4
Mean		14.5	15.0	14.7	13.4	15.1	14.2
Halawa	Control	12.1	15.2	13.7	12.8	15.1	14.0
	Stimulate	13.5	15.1	14.3	12.3	13.5	12.9
Mean		12.8	15.1	14.0	12.6	14.3	13.4
Weed control (W)	Control	13.6	15.0	14.3	13.7	15.7	14.7
	Stimulate	13.3	14.5	13.9	13.4	15.4	14.4
Mean		13.4	14.8		13.5	15.5	
L.S.D at 0.05							
V				*NS*			0.6
S				*NS*			*NS*
W				0.6			0.6
Vx S				*NS*			1.1
Vx W				*NS*			*NS*
S x W				*NS*			*NS*
V x S x W				*NS*			*NS*

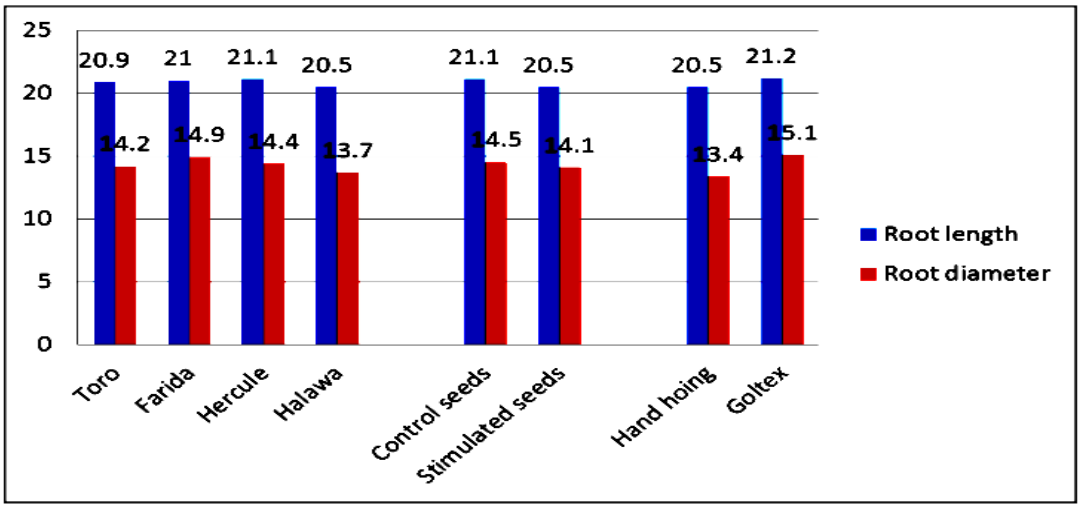

Fig. (1): Response of four sugar beet varieties to seed treatments and weed control methods on root dimensions (mean of two seasons).

2. Juice purity percentage:

Data illustrated in Table (4) and Fig. (2) appear the effect of weed control (hand hoing - chemical by Goltex), seed treatment (control - stimulated) and four sugar beet varieties (Toro - Farida - Hercule - Halawa) as well as their interaction on purity percentage. It is clearly that neither studied varieties nor seed treatment attained a significant influence on this trait. However, Toro sugar beet variety and stimulated seeds attained the higher purity percentage in both growing seasons. Concerning the effect of weed control methods on purity percentage at harvest, Goltex weed method attained the highest purity percentage in both seasons and it was significantly in the 1st season only.

Moreover, the interaction between examined sugar beet varieties and seed treatments had a statistical effect in both growing seasons where the highest purity percentage was obtained by stimulated seeds of Toro variety. As for the interaction between varieties and weed control methods, also the interaction between seed treatments and weed control methods, none of these combinations attained any significance in this trait in both growing seasons. With respect to the interaction effect between the studied factors, the obtained results in Table (4) appeared a significant influence on purity percentage in the 1st season only. Stimulated the seeds of Toro sugar beet variety and using Goltex method for weed control attained the highest purity percentage that was 91.8% in the 1st season. However, in the 2nd season the interaction effect between all studied factors was not great enough to reach the 5% level of significance.

3. Sucrose percentage:

The influence of examined sugar beet varieties and seed treatments on the values of sucrose percentage at harvest (Table 5), it is clearly that neither studied varieties nor seed treatment attained a significant influence on this trait. However, Toro sugar beet variety and stimulated seeds attained the higher sucrose percentage in both growing seasons. The influence of weed control methods on sucrose percentage were significant in the 1st season only while in the 2nd season the differences were not great enough to be significance. Chemical weed control method by using Goltex recorded the highest values of this trait that were 20.1% and 19.5% respectively in both seasons.

Concerning the interaction between the various combinations between the studied factors. The obtained results cleared that the interaction effects between the examined combinations almost were insignificant except the interaction between variety and seed treatment in both seasons, where stimulated seeds of Toro variety obtained the highest sucrose percentage in both seasons. These findings were true in the two growing seasons.

5. Root yield (ton /fad.):

Data presented in Table (6) and Fig. (3) reveal the effect of weed control (hand hoing - chemical by Goltex), seed treatment (control - stimulated) and four sugar beet varieties (Toro - Farida - Hercule - Halawa) as well as their interaction on root yield (ton/ fad.). The tested varieties appeared a different effect on the values of root yield of sugar beet. Halawa sugar beet variety gave the highest root yield in both seasons that was 37 and 35.4 ton/fad. respectively in both seasons. However, this advantage was significantly in both seasons. These findings are in harmony with those obtained by **El-Hennawy and El-Hawary (1995), Al-Sayed (1997), El-Hawary and Mokadem (1999), Abou-Salama and El-Syiad (2000)**, **Nassar (2001), El-Hinnawy *et al.* (2003)** and **El-Hawary *et al.* (2013).** The differences between varieties in this character could be due to the differences between the used varieties in their genetically

Table (4): Purity (%) of four sugar beet varieties as affected by seed treatments and weed control methods.

		Weed control (W) 2012/ 2013			Weed control (W) 2013/ 2014		
Varieties (V)	Seed treatments (S)	Hand hoing	Goltex	Mean	Hand hoing	Goltex	Mean
Toro	Control	82.4	88.7	85.6	85.2	85.3	85.3
	Stimulate	89.0	91.8	90.4	89.9	88.3	89.1
Mean		85.7	90.3	88.0	87.6	86.8	87.2
Farida	Control	84.5	87.5	86.0	85.3	83.6	84.4
	Stimulate	87.3	89.7	88.5	85.3	88.4	86.8
Mean		85.9	88.6	87.2	85.3	86.0	85.6
Hercule	Control	84.0	88.8	86.4	85.0	90.0	87.5
	Stimulate	84.6	88.0	86.3	86.9	82.2	84.6
Mean		84.3	88.4	86.4	86.0	86.1	86.0
Halawa	Control	85.0	88.5	86.7	81.4	85.3	83.4
	Stimulate	80.7	83.2	82.0	82.5	86.8	84.7
Mean		82.9	85.8	84.3	82.0	86.1	84.0
Weed control (W)	Control	84.0	88.4	86.2	84.2	86.0	85.1
	Stimulate	85.4	88.2	86.8	86.2	86.4	86.3
Mean		84.7	88.3		85.2	86.2	
L.S.D at 0.05							
V				*NS*			*NS*
S				*NS*			*NS*
W				2.3			*NS*
Vx S				3.5			4.6
Vx W				*NS*			*NS*
S x W				*NS*			*NS*
V x S x W				6.6			*NS*

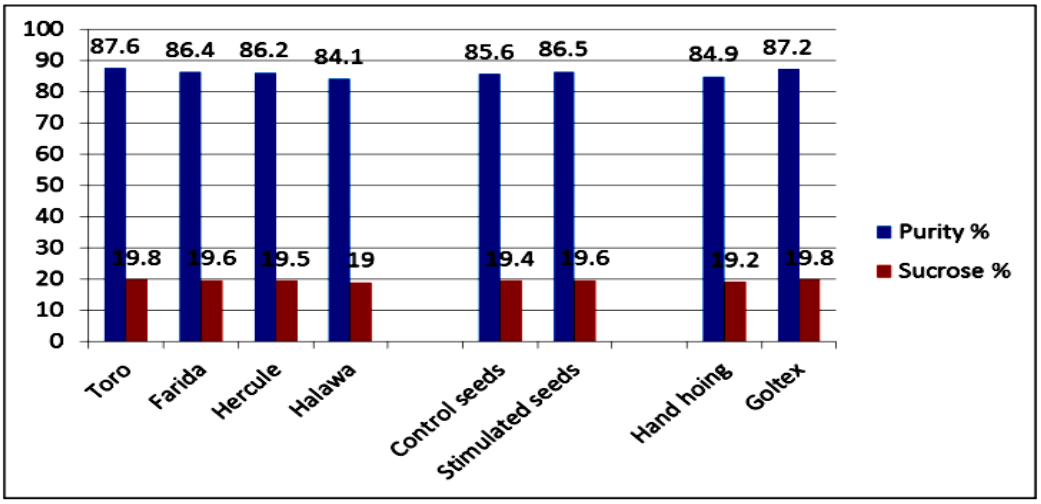

Fig. (2): Response of four sugar beet varieties to seed treatments and weed control methods on purity and sucrose percentages (mean of two seasons).

Table (5): Sucrose (%) of four sugar beet varieties as affected by seed treatments and weed control methods.

		Weed control (W) 2012/ 2013			Weed control (W) 2013/ 2014		
Varieties (V)	**Seed treatments (S)**	**Hand hoing**	**Goltex**	**Mean**	**Hand hoing**	**Goltex**	**Mean**
Toro	**Control**	18.6	20.1	19.3	19.2	19.2	19.2
	Stimulate	20.3	20.9	20.6	20.2	19.7	19.9
Mean		19.4	20.5	20.0	19.7	19.5	19.6
Farida	**Control**	19.2	19.8	19.5	19.2	18,9	19.0
	Stimulate	19.7	20.4	20.1	19.3	20.0	19.6
Mean		19.5	20.1	19.8	19.3	19.5	19.4
Hercule	**Control**	19.0	20.2	19.6	19.3	20.5	19.9
	Stimulate	19.3	20.0	19.7	19.8	18.6	19.2
Mean		19.2	20.1	19.6	19.6	19.5	19.5
Halawa	**Control**	19.3	20.1	19.7	18.3	19.5	18.9
	Stimulate	18.1	18.8	18.5	18.7	19.7	19.2
Mean		18.7	19.5	19.1	18.5	19.6	19.0
Weed control (W)	**Control**	19.0	20.1	19.6	19.0	19.5	19.2
	Stimulate	19.4	20.0	19.7	19.5	19.5	19.5
Mean		19.2	20.1		19.3	19.5	19.4
L.S.D at 0.05							
V				***NS***			***NS***
S				***NS***			***NS***
W				0.6			***NS***
Vx S				0.8			1.1
Vx W				***NS***			***NS***
S xW				***NS***			***NS***
V x S x W				***NS***			***NS***

Table (6): Root yield (ton/fad.) of four sugar beet varieties as affected by seed treatments and weed control methods.

		Weed control (W) 2012/ 2013			Weed control (W) 2013/ 2014		
Varieties (V)	**Seed treatments (S)**	**Hand hoing**	**Goltex**	**Mean**	**Hand hoing**	**Goltex**	**Mean**
Toro	**Control**	27.230	33.280	30.250	24.500	29.020	26.760
	Stimulate	24.110	28.900	26.510	19.730	22.100	20.920
Mean		25.670	31.090	28.380	22.120	25.560	23.840
Farida	**Control**	29.280	34.180	31.730	20.150	24.720	22.440
	Stimulate	35.750	37.350	36.550	26.500	29.690	28.100
Mean		32.510	35.760	34.140	23.330	27.200	25.270
Hercule	**Control**	32.770	36.540	34.660	24.840	27.510	26.170
	Stimulate	31.030	34.28	32.650	24.840	25.610	25.220
Mean		31.900	35.410	33.650	24.840	26.560	25.700
Halawa	**Control**	35.150	36.37	35.760	24.020	26.800	25.410
	Stimulate	36.270	40.310	38.290	22.970	27.930	25.450
Mean		35.710	38,340	37.020	23.490	27.360	35.430
Weed control (W)	**Control**	31.110	35.090	33.100	23.380	27.010	25.190
	Stimulate	31.790	35.210	33.500	23.510	26.330	24.920
Mean		31.450	35.150		23.440	26.670	
L.S.D at 0.05							
V				1.040			0.675
S				***NS***			***NS***
W				0.655			***NS***
Vx S				1.040			1.070
Vx W				***NS***			0.920
S x W				***NS***			***NS***
V x S x W				1.850			1.300

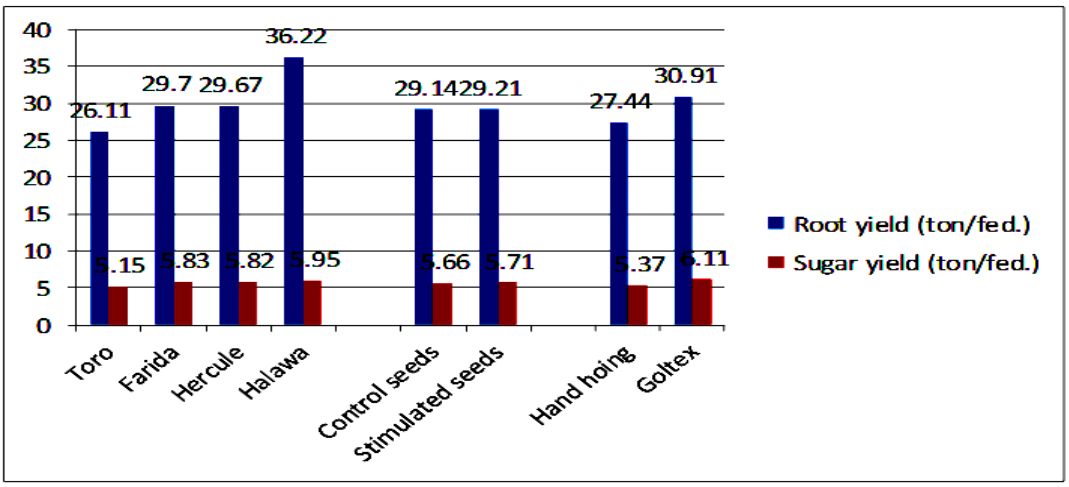

Fig. (3): Response of four sugar beet varieties to seed treatments and weed control methods on root and sugar yields (mean of two seasons).

aspects. The effect of seed treatments on sugar beet root yield was not significant in both seasons. Using Goltex recorded the best results than hand hoing for weed control in both seasons while, the influence of weed control methods on root yield was significantly in 1st season only.

In connection with the effect of interaction between studied sugar beet varieties and seed treatments had a statistical effect in both growing seasons where the highest root yield was obtained by stimulated seeds of Halawa variety in 1st season and Farida variety in 2nd season. However, Goltex method for weed control of Halawa sugar beet variety recorded the highest root yield in both seasons, the interaction between varieties and weed control methods had a significant effect in 2nd season only. Thus, it could be noted that the combination between seed treatments and weed control methods had no statistical effect on root yield of sugar beet roots in both seasons. The second order interaction between varieties, seed treatments and weed control methods and its effect on root yield (ton/fad.) was significant in both seasons. Using Goltex weed control method and stimulated seeds for Halawa variety in 1st season and for Farida variety in 2nd season was the best interaction that recorded 40.3 and 29.6 tons/fad. root yield, respectively.

6. Sugar yield (ton/fad.):

The available data in Table (7) pointed out that the tested varieties appeared a different effect on the values of sugar yield of sugar beet. Moreover, this advantage was significantly in both seasons. These findings are in agreement with those obtained by **El-Hennawy and El-Hawary (1995), Al-Sayed (1997), El-Hawary and Mokadem (1999), Abou-Salama and El-Syiad (2000)**, **Nassar (2001), El-Hinnawy *et al.* (2003) and El-Hawary *et al.* (2013).** The effect of seed treatments on sugar yield was significant in the 2nd season. Stimulated sugar beet seeds gave the highest sugar yield (4.8 tons/fad.) also it gave the highest sugar yield (6.5 tons/fad.) in the 1st season but without significance. These results are in coincide with those deduced by **Hilal (2000)** and **Aly *et al* (2009)**. Concerning the effect of weed control methods on sugar yield at harvest, Goltex weed method attained the highest sugar yield that was (7.0 and 5.2 tons/fad.) in both seasons respectively and the data was significantly in both seasons. This result is in line with that reported by **Abd El-Aal (2001)** and **El-Geddawy *et al.* (2001)**.

Regarding, the influence of interactions on sugar yield, the interaction between studied varieties and seed treatments attained a significant effect in both growing seasons. where the highest sugar yield (7.3 and 5.5 tons/fad.) was obtained by stimulated seeds of Farida variety in both seasons respectively. Thus, the interaction between varieties and weed control methods had a significant effect in 2nd season only. However, it could be noted that the combination between seed treatments and weed control methods had no statistical effect on sugar yield of sugar beet roots in both seasons. Belong to the combination between examined varieties, seed treatments, weed control methods and its effect on sugar yield (ton/fad.). given results show that using Goltex weed control method and stimulated seeds for Farida variety in both seasons was the best interaction that recorded (7.6 and 5.9 tons/fad.) sugar yield, respectively. This combination had a significant effect in 2nd season only while in the 1st season the differences were not great enough to be significance.

Conclusion:

It can be concluded that the studied varieties especially Farida and/or Halawa varieties using stimulated seeds and Goltex as a weed control method could be recommended for maximizing sugar beet productivity or sowing Toro variety using stimulated seeds and Goltex as a weed control method could be recommended for maximizing sugar beet juice quality under the environmental conditions of Ayat, Giza Governorate.

Table (7): Sugar yield (ton/fed.) of four sugar beet varieties as affected by seed treatments and weed control methods.

		Weed control (W) 2012/ 2013			Weed control (W) 2013/ 2014		
Varieties (V)	**Seed treatments (S)**	**Hand hoing**	**Goltex**	**Mean**	**Hand hoing**	**Goltex**	**Mean**
Toro	**Control**	5.050	6.670	5.860	4.700	5.580	5.140
	Stimulate	4.890	6.020	5.460	3.980	4.340	4.160
Mean		4.970	6.350	5.660	4.340	4.960	4.650
Farida	**Control**	5.630	6.760	6.190	3.870	4.670	4.270
	Stimulate	7.030	7.620	7.330	5.110	5.950	5.530
Mean		6.330	7.190	6.760	4.490	5.310	4.900
Hercule	**Control**	6.230	7.405	6.810	4.810	5.630	5.220
	Stimulate	5.980	6.860	6.420	4.900	4.740	4.820
Mean		6.110	7.130	6.620	4.850	5.180	5.020
Halawa	**Control**	6.790	7.310	7.055	4.370	5.210	4.790
	Stimulate	6.560	7.580	7.070	4.290	5.510	4.900
Mean		6.680	7.440	7.060	4.330	5.360	4.850
Weed control (W)	**Control**	5.920	7.040	6.480	4.440	5.270	4.850
	Stimulate	6.120	7.025	6.570	4.575	5.140	4.850
Mean		6.25	7.030		4.500	5.200	
L.S.D at 0.05							
V				0.100			0.200
S				***NS***			0.130
W				0.210			0.130
Vx S				0.413			0.270
Vx W				***NS***			0.260
S x W				***NS***			***NS***
V x S x W				***NS***			0.370

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استجابة أربعة أصناف من بنجر السكر لمعاملة التقاوي وطرق مكافحة الحشائش تحت ظروف محافظة الجيزة

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أُجريت تجربة حقلية بمنطقة العياط محافظة الجيزة خلال موسمي الزراعة ٢٠١٢/٢٠١٣ و٢٠١٣/٢٠١٤ لدراسة تأثير معامله التقاوي وطرق مكافحه الحشائش على محصول وجوده أربعة أصناف من أصناف بنجر السكر وهى تورو وحلاوه وفاريدا وهركل باستخدام تصميم القطع المنشقة مرتين.

وأظهرت نتائج الدراسة ما يلي: كان للأصناف تأثيرا معنويا على صفات طول الجذر في موسم الزراعة الأول وقطر الجذر في الموسم الثاني وكذلك محصول الجذور ومحصول السكر في كلا الموسمين حيث أعطى الصنف فاريدا أفضل معدلات لطول الجذر (٢٣,٩ سم) وقطر الجذر (١٦ سم)، كما أن أعلى نسبة نقاوة للعصير والتي بلغت (٨٧,٦%) كذلك أعلى نسبة سكروز (١٩,٨%) أعطاها الصنف تورو بحساب متوسط النتائج لموسمي الزراعة، بالإضافة إلى أن الصنف حلاوة أعطى أفضل معدل لمحصول الجذور والسكر والذي بلغ (٣٦,٢٢ و ٥,٩٥ طن/فدان) على التوالي وأظهرت معاملة البذور تأثيراً معنوياً على صفات طول الجذر في الموسم الأول ومحصول السكر في الموسم الثاني كما ان البذور المعاملة أعطت أفضل النتائج لجميع الصفات المدروسة إلا أن الاختلافات لم تكن كبيرة بالقدر الكافي لإحداث تأثير معنوي واضح على باقي الصفات. كما أظهرت طرق مكافحة الحشائش تأثيرا معنويا على صفة طول الجذر في الموسم الثاني وصفات نقاوة العصير ونسبة السكروز ومحصول الجذور في الموسم الأول بالإضافة إلى صفات قطر الجذر ومحصول السكر في كلا الموسمين حيث سجلت طريقة مكافحة الحشائش باستخدام الجولتكس أعلى القيم لطول الجذر (٢١,٢ سم) وقطر الجذر (١٥,١ سم) ونسبة النقاوة (٨٧,٢%) ونسبة السكروز (١٩,٢%) ومحصول الجذور (٣٠,٩ طن للفدان) ومحصول السكر (٦,١١ طن للفدان).

أما بالنسبة لتأثير تداخل عوامل الدراسة فيما بينها فلقد حققت تأثيراً معنوياً في صفات طول وقطر الجذر في كلا موسمي الزراعة وصفة نقاوة العصير في موسم الزراعة الأول وكذلك صفة محصول السكر في موسم الزراعة الثاني حيث أدى استخدام بذور بنجر السكر المعاملة صنف فاريدا مع استخدام طريقة الجولتكس في مكافحة الحشائش لتحقيق أعلى القيم بالنسبة لطول الجذر (٢٥,٣ سم) في موسم الزراعة الأول وصفات قطر الجذر (١٧,٥ سم) ومحصول الجذور (٢٩,٦٩ طن للفدان) في موسم الزراعة الثاني وصفة محصول السكر (٧,٦٢ و ٥,٩٥ طن للفدان) في كلا الموسمين على التوالي. كما أدى استخدام بذور بنجر السكر المعاملة صنف تورو مع استخدام طريقة الجولتكس في مكافحة الحشائش لتحقيق أعلى القيم بالنسبة لصفة طول الجذر (٢١,٤ سم) في موسم الزراعة الثاني وصفات نسبة نقاوة العصير (٩١,٨%) ونسبة السكروز (٢٠,٩%) في موسم الزراعة الأول.

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