

Effect of sowing dates and plant spacing on growth and yield of some Jew's mallow ecotypes (*corchorus olitorius* L.) under South Valley condition.

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Abstract

A field experiment was conducted at the Experimental Farm, Faculty of Agriculture, South Valley University, during two growing summer seasons 2009 and 2010 to study the effect of sowing dates (Feb, 25 and April, 25 and three plant spacing ,10 and 15 cm between plants) on growth and yield of some Jew's mallow ecotypes (*corchorus olitorius* L.). The genetic materials used in this study included fifteen ecotypes of Jew's mallow, which were collected from different regions of Egypt. Results of the experiment revealed that there were significant differences among ecotypes for all studied traits in both seasons. Ecotype El-Behera gave the highest value of fresh leaf weight and plant height in both seasons, ecotype Beni Suef for dry leaf yield, ecotype Sohag for total fresh yield and Alexandria for number of branches per plant in both seasons. Sowing on April 25 gave significantly higher total fresh yield, number of branches/plant, green and dry fresh yield and longest plant height compared with early sowing Feb. 25 in both seasons. Plant spacing had a significant effect on all studied traits

in both seasons. The closest spacing 5 and 10 cm between plants gave higher value for total fresh yield, green and dry leaf yield and plant height compared with spacing 15 cm between plants in both seasons. The wide spacing 15 cm gave the higher number of branches per plants compared with the other tow spacing used in this study in both seasons.

Key Words: Jew's mallow, ecotypes, sowing dates, plant spacing, green dry leaf yield, total fresh yield.

Introduction

Jew's mallow, *corchorus olitorius*, is one of the popular leafy vegetable crops in Egypt. It has a good place in the Egyptian diet. It is consumed either fresh or dried. Jew's mallow grown nearly all year round, but particularly as a summer crop (Hassan 1994). The total cultivated area of this crop in Egypt was estimated at 6318 Feddan for fresh yield in the summer season of 2008 with a mean of 9.35 ton/feddan. Also, the estimated area was 2017 feddan for fresh yield in the fall season with a mean 6.71 ton/feddan* .

Ali (1996) found that Jew's mallow is classified as a facultative short day plant in summer

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planting (April 11-13) and day – neutral in both early summer (Feb. 1-5) and autumn plantings (Oct. 1-3). Jew's mallow grows well at high temperature (25-35°C) and high humidity. Its harvesting usually begins 40-60 days after planting. Appropriate sowing date of various vegetable crops results in higher economic yield without involving extra cost as it helps genotypes to express their full growth potential. In Egypt, Abd-Allah (2010) studied plant spacing and sowing dates on some Jew's mallow ecotypes. He found that the highest total fresh leafy yield obtained from sowing on mid May and mid April. On the other hand, yield potential of Jew's mallow can be substantially improved via optimizing cultural practices including plant densities (Hamdy *et al.*, 1973 and Ali 1996). Nevertheless, only little or no information is available on prices planting dates and densities in production of Jew's mallow under condition of different regions of southern Egypt.

The present work was carried out to study the effect of fifteen Jew's mallow ecotypes collected from different regions of Egypt), planting date and plant density on growth and yield.

*Dep. Agric. Statistics, Ministry of Agriculture, Giza, Egypt. 2008.

Material and Methods

This work was conducted in the Experimental Farm of South Valley University, to study the effect of ecotypes, planting date and spacing on growth and yield of Jew's mallow *corchorus olitorius* L. The experiment was carried out during 2009 and 2010 summer seasons. Treatments included 15 ecotypes, two sowing dates (Feb. 25 (D1) and April 25 (D2) and three planting distances between plants, 5, 10 and 15 cm.

Fifteen ecotypes of Jew's mallow, were collected from different governorate regions of Egypt, and their serial numbers, and source from which they were obtained are presented in Table (1).

Table (1): Serial Nos, source of Jew's mallow (Melokhia) ecotypes:

Ecotypes	Source
1	Louyer
2	Giza
3	Assuit
4	El-Esmalia
5	El-Behera
6	Beni Suif
7	Aswan
8	Qena
9	Sohag
10	E.A.O
11	El-Minia
12	Alexandria
13	Domuiat
14	El-Mansoura
15	New Valley

* E.A.O.= Egyptian Agricultural organization.

A randomized complete block design in split, split plot system with three replications was used. The ecotypes were arranged in the main plots, sowing dates in the sub-plot, and plant densities the sub-sub plots. Each plot was 4×3 m. The soil types were clay loam. Seeds were sown in rows about 20 cm apart and then irrigated. As seedlings were established plot were thinned to the required distances namely, 5, 10 and 20 cm between plants. Weeds were controlled by hand hoeing. All plots received ammonium nitrate(33.5% N) at rate of 300 Kg/feddan and calcium superphosphate (15.5% P₂O₅) at 250 Kg/feddan.

The recorded data:

1. Foliage fresh yield (weight of whole plants of 0.25 m²) and then transferred into (ton/ feddan).

2. Plant height in(cm): Average plants height per in 0.25 m²
3. Number of branches per plant : Average number of branches per plant in 0.25 m².
4. Green leaf yield (weight of picked leaves per 0.25 m² and then transferred into (ton/ feddan).
5. Dry leaf yield (ton/ feddan).

Statistical Analysis:

All data were statistically analyzed (Gomez and Gomez 1984) following the appropriate procedures the appropriate procedures of analysis of variance (ANOVA) for the experimental model and design used in the present study.

Results

1- Foliage fresh yield (ton/ feddan):

Effect of ecotypes (E), planting dates (D) and spacing (S) on foliage fresh yield (ton/ feddan)

in the two summer seasons are presented in Tables 2 and 3. Significant differences were found among ecotypes. Ecotype Sohag gave the highest fresh yield (8.289 ton/fed.) followed by ecotype El-Behera 8.254 ton/fed. In the first season and ecotype El-Behera followed by ecotype Sohage in the second season, furthermore ecotype Domuiat gave the lowest value in both seasons. Planting dates have a significant effect on fresh foliage yield. Planting at April 25 gave significantly higher yield than early planting date (Feb. 25) in both summer seasons. Plant density had a significant effect on fresh foliage yield. The close spacing gave higher yield compared with the other tow spacing (10 and 15 cm) between plants in both summer seasons. A significant interaction (EXD) was found for this trait. Data in tables (2 and 3) illustrated that sowing ecotype Sohage in April 25 gave the highest value in both summer seasons, while the ecotype no. 13 gave the lowest value in the first season and ecotype New Valley in the second season. Interaction among (E×D×S) were recorded for this trait. The highest significant value for Foliage fresh yield were obtained by sowing Ecotype no. 9 (17.6 ton/feddan) in April 25 under close spacing (52 cm) between plants followed by ecotypes no. 8 (16.906 ton/feddan) compared with other tow spacing (10 and 15 cm), while the ecotype no. 12 gave the lowest value (1.705 and 1.955

ton/feddan) in both summer seasons, respectively.

2- Plant height (cm):

As shown in tables (4 and 5) ecotypes significantly differed in respect of plant height ecotype El-Behera gave the highest plants, followed by ecotypes Qena and Domuit in both seasons, while plants of ecotype no. 10 was the shortest in the first season and ecotype New Valley in the second seasons. According to tables (4 and 5) sowing dates showed significant effect on plant height in both seasons. The tallest plants were obtained when the ecotypes were planted on April 25 than Feb. 25 planting. Spacing between plants had a significant effect on plant height. The close spacing gave the longer plants compared with wide spacing in both seasons.

Ecotype El-Esmalia Planted on April 25 gave the longest plant in both seasons, while the ecotype no. 12 gave the shortest plant in the first season and ecotype no. 10 in the second season. Planting ecotype no.4 on Feb. 25, gave the tallest plant in the first season and ecotype no. 5 gave the shortest value in the second season, moreover the ecotype no. 12 gave the shortest plant in both seasons. Generally, ecotype no.5 when planted on April 25 under close spacing (5cm) between plants gave the tallest plant in both seasons. The shortest plants were obtained from ecotype no. 12 when the crop was planted on Feb. 25 under wide spacing in both seasons.

3- Number of branches /plant:

Data for this character are shown in tables 6 and 7. branching ability significantly varied among ecotypes. Ecotype no. 12 gave the highest branching ability followed by ecotype no. 11, while ecotype no. 8 gave the lowest value in both seasons. Planting dates had significant effect on this trait. The highest value obtained from the sowing on April 25 than Feb. 25 in both seasons. Population density has a significant effect on branching ability. The wide spacing gave the higher number of branches compared with two other spacing in both seasons. EXD interaction effect was significant on number of branches/plant. Results in table 6 and 7 indicated that sowing ecotype no. 12 on April 25 and Feb. 25 gave the highest significant values, while the ecotype no. 9 gave the lowest value in both season.

The interactions among ecotypes \times dates \times spacing was significant. Planting on April 25, ecotype no. 12 under wide spacing (15 cm) between plants followed by 7 ecotype no. 11 gave the highest value in both seasons, while the ecotype no. 6 under close spacing (5 cm) between plants gave the lowest value in the first season and ecotype no. 5 in the second season. Sowing on Feb. 25, ecotype no. 12 followed by ecotype no. 7 under wide spacing (15 cm) gave the highest value in the first season, and ecotype no. 7 followed by ecotype no. 12 in the second season.

Generally, sowing ecotype no. 12 on April under wide spacing (15 cm) between plant gave the highest value in both seasons, moreover, sowing ecotype no. 15 on Feb. 25 under close spacing (5 cm) between plants gave the lowest value in both seasons.

4- Green leaf yield (ton/fed.):

As shown in table 8 and 9 ecotypes significantly differed in their green leaf yield. Ecotype no. 7 followed by ecotype no. 10 and 5 gave the highest green leaf yield, while ecotype no. 3 gave the lowest value in both seasons 2009 and 2010. planting data had a significant effect on green leaf yield. Showing on April 25 was higher in green leaf yield than the sowing on Feb. 25 in both seasons. Spacing between plants had a significant effect on green leaf yield. The close spacing gave the higher value compared with tow other spacing. There were a significant interaction between ecotypes and planting date. Ecotype no. 7 followed by no. 3, 4 and 15 under sowing Feb. 25 gave the highest green leaf yield in both seasons, while ecotype no. 8 gave the lowest value in the first season 2009 and ecotype no. 12 in the second season 2010. moreover, ecotype no. 10 followed by ecotype no. 15, 12, 9 and 8 under sowing on April 25 gave the highest value, while the ecotype no. 3 gave the lowest value in both seasons. A significant ecotypes \times plant spacing interactions was recorded for this character. Ecotype no. 7 under the close spacing followed by ecotype no.

15 and 10 gave the highest green leaf yield, while the ecotype no. 3 gave the lowest value in both seasons.

Planting on April 25, ecotype no. 10 followed by no. 15, 8 and 9 under close spacing between plants (5 cm) gave the highest value in both seasons. Moreover, ecotype no. 3 under wide spacing gave the lowest value in both seasons. Planting on Feb. 25 ecotype no. 7 and 13 under close spacing between plants gave the highest value in both seasons. However, ecotype no. 15 under wide spacing gave the lowest value in both seasons.

5- Dry leaf yield (ton /fed.)

Data for this character are presented in Tables 10 and 11. Significant differences were found among ecotypes, sowing dates and plant spacing. Ecotype no. 6 followed by ecotypes no. 5, 4, 10, 12 and 15 gave the highest value, while the ecotype no. 3 gave the lowest value in both seasons. The interaction of ecotypes and planting dates was sig-

nificant. Ecotype no. 4 gave the highest value when the plant was sowing on Feb. 23 followed by ecotype no. 5, 4, 10, 12 and 15, while the lowest value obtained from ecotype no. 9 in both seasons.

Moreover, ecotype no. 6 gave the highest value when the plant was sowing on April 25 followed by ecotype no. 5, 12 and 9, while the lowest value obtained from ecotype no. 11 in both seasons. Significant ecotype \times plant spacing was found for dry leaf yield. Ecotype no. 6 under high density produced the highest values dry leaf yield followed by ecotype no. 4, 5 and 12, while ecotype no. 2 under low density gave the lowest value in both seasons. Sowing on April 25, ecotype no. 6 followed by ecotype no. 12, 8 and 5 gave the highest value under high density (5 cm) between plants in both seasons. Sowing on Feb. 25, ecotype no. 9 under wide spacing gave the lowest value in both seasons.

Table (2): Effect of Jew's mallow ecotypes, planting dates and spacing on foliage fresh yield(ton/fed) in the first summer season 2009

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb,25 (D ₁)	5 cm, (S ₁)	3.730	3.500	3.205	5.205	4.105	2.805	4.165	3.305	3.455	3.205	3.410	2.50	4.810	2.904	3.505	3.587
	10 cm, (S ₂)	3.365	2.770	3.021	4.198	3.405	2.650	3.535	2.806	2.925	2.653	2.538	2.105	3.715	3.105	2.778	3.038
	15 cm, (S ₃)	2.605	2.048	2.800	3.200	2.700	2.398	2.905	2.308	2.408	2.073	3.005	1.705	2.910	3.100	2.055	2.549
Mean over all (S)		3.233	2.773	3.009	4.201	3.403	2.618	3.535	2.806	2.929	2.644	2.984	2.103	3.812	3.036	2.779	3.058
April,25 (D ₂)	5 cm, (S ₁)	16.148	15.267	13.905	16.102	16.302	14.555	15.308	16.906	17.600	14.850	14.445	15.445	11.322	14.805	14.605	14.638
	10 cm, (S ₂)	11.625	10.898	10.505	12.202	13.105	11.548	10.916	12.650	13.645	11.405	10.310	10.850	9.055	12.248	10.907	11.438
	15 cm, (S ₃)	7.010	6.244	7.105	8.305	9.904	8.605	6.538	7.806	9.665	8.005	6.207	6.310	7.103	9.606	6.306	7.654
Mean over all (S)		11.594	10.821	10.505	12.203	13.104	11.569	10.921	12.354	13.649	11.420	10.321	10.868	9.160	12.226	10.606	9.027
Mean over all (D)	5 cm, (S ₁)	9.969	9.383	8.555	10.654	10.204	8.680	9.736	10.105	10.528	9.027	8.928	8.973	8.006	8.854	9.005	7.029
	10 cm, (S ₂)	7.495	6.834	6.763	8.200	8.255	7.099	7.226	7.578	8.285	7.027	6.424	4.477	6.385	7.677	6.843	3.539
	15 cm, (S ₃)	4.808	4.174	4.953	5.753	6.302	5.502	4.722	5.057	6.055	5.039	4.006	4.008	5.007	6.353	4.181	5.101
Mean overall (D and S)		7.414	6.797	6.757	8.202	8.254	7.094	7.228	7.580	8.289	7.031	6.652	6.486	6.486	7.428	6.693	

L.S.D 0.05=

E=0.506 D=0.595 S=0.219 E×D=0.744

E×S=0.849

D×S=0.310

E×D×S=1.201

Table (3): Effect of Jew's mallow ecotypes, planting dates and spacing on foliage fresh yield (ton/Fed.) in the second summer season 2010.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb,25 (D ₁)	5 cm, (S ₁)	3.638	3.608	3.355	5.205	4.105	2.805	3.980	3.305	3.012	3.322	3.535	2.868	3.910	3.100	3.652	3.583
	10 cm, (S ₂)	2.668	3.205	3.180	4.198	3.405	2.650	3.445	2.807	2.755	2.970	3.250	3.370	3.355	2.770	2.905	3.070
	15 cm, (S ₃)	2.458	2.800	2.768	3.200	2.700	2.398	2.910	2.295	2.510	2.455	3.060	1.955	3.175	2.345	2.805	2.691
Mean over all (S)		2.9421	3.204	3.101	4.063	3.505	3.021	3.445	2.802	2.759	2.882	3.282	2.398	3.480	2.738	3.121	3.115
April, 25 (D ₂)	5 cm, (S ₁)	16.550	13.645	13.875	16.102	16.302	14.555	15.600	17.538	17.045	14.440	13.405	15.658	11.540	14.300	9.983	14.451
	10 cm, (S ₂)	11.675	9.758	9.810	12.202	13.105	11.548	11.062	12.348	13.407	11.105	9.610	10.830	8.858	11.750	9.755	11.047
	15 cm, (S ₃)	6.838	5.956	5.857	8.305	9.904	8.605	6.398	5.603	9.665	7.822	5.838	6.005	6.105	9.298	5.905	7.073
Mean over all (S)		11.688	9.786	9.847	10.471	13.018	11.087	11.020	11.830	13.372	11.122	9.618	10.831	8.834	11.783	8.547	10.857
Mean over all (D)	5 cm, (S ₁)	10.09	8.626	8.615	8.466	10.422	8.936	9.790	10.422	10.028	8.881	8.470	9.263	7.725	8.700	6.818	9.017
	10 cm, (S ₂)	7.172	6.481	6.495	7.898	8.258	7.053	7.253	7.578	8.081	6.988	6.430	6.600	6.107	7.260	6.330	7.059
	15 cm, (S ₃)	4.648	4.378	4.313	5.436	6.105	5.174	4.654	3.949	6.088	5.138	4.449	3.980	4.640	5.822	4.353	4.882
Mean overall (D and S)		7.305	6.495	6.474	7.267	8.262	7.054	7.233	7.316	8.066	7.002	6.450	6.614	6.157	7.261	5.834	

L.S.D 0.05=

E=0.780 D=0.714 S=0.314 E×D=1.103

E×S=1.217

D×S=0.445

E×D×S=1.722

Table (4): Effect of Jew's mallow ecotypes, planting dates and spacing on plant height (cm) in the first summer season 2009.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb. 25 (D ₁)	5 cm, (S ₁)	26.65	28.01	28.87	29.37	29.32	26.90	27.48	31.53	25.18	27.37	26.90	23.50	30.30	32.00	28.75	28.14
	10 cm, (S ₂)	24.80	26.80	27.89	28.47	28.233	25.44	25.23	27.36	21.78	23.18	23.53	18.23	26.97	26.67	24.77	25.29
	15 cm, (S ₃)	23.87	24.87	26.98	26.83	26.65	23.28	22.10	25.03	19.83	20.87	20.48	17.03	25.30	24.33	20.77	23.22
Mean over all (S)		25.11	25.56	27.90	28.22	28.06	25.21	24.94	27.98	22.27	23.81	23.64	19.59	27.52	27.67	24.76	25.55
April, 25 (D ₂)	5 cm, (S ₁)	73.65	68.92	70.62	73.07	82.03	73.85	74.59	77.75	73.10	66.75	66.83	62.92	77.20	75.68	65.70	72.18
	10 cm, (S ₂)	70.82	67.86	69.20	71.32	80.43	70.10	70.97	73.80	70.68	62.80	63.32	58.88	73.10	71.57	61.30	64.08
	15 cm, (S ₃)	69.25	67.30	67.67	67.37	78.25	65.25	68.13	71.05	67.65	59.32	61.33	57.53	68.60	70.33	57.63	66.44
Mean over all (S)		71.24	68.03	69.16	70.58	80.24	69.73	71.23	74.20	70.48	62.96	63.83	59.78	72.97	72.53	61.54	69.23
Mean over all (D)	5 cm, (S ₁)	50.15	48.46	49.74	51.22	55.68	50.38	51.04	54.64	49.14	47.06	46.87	43.21	53.75	53.84	47.23	50.15
	10 cm, (S ₂)	47.81	47.33	48.53	49.89	54.33	47.77	48.10	50.58	46.23	42.99	43.43	38.56	50.03	49.12	43.03	47.81
	15 cm, (S ₃)	46.56	46.08	47.33	47.10	52.45	44.27	45.12	48.04	43.74	40.09	40.91	37.28	46.95	47.33	39.20	46.56
Mean overall (D and S)		48.17	47.29	48.53	49.40	54.15	47.47	48.09	51.09	46.37	43.38	43.73	39.68	50.24	50.10	43.15	

L.S.D 0.05=

E=0.313

D=0.467 S=0.135 E×D=0565

E×S=0.521

D×S=0.190

E×D×S= 0.737

Table (5): Effect of Jew's mallow ecotypes, planting dates and spacing on plant height (cm) in the second summer season 2010.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	26.87	28.28	27.57	30.22	30.48	25.82	27.40	30.87	25.72	27.50	27.27	23.77	30.65	32.03	29.70	28.28
	10 cm. (S ₂)	24.85	26.53	27.53	28.37	28.83	24.70	24.30	27.53	21.85	23.47	23.77	19.23	27.87	27.53	25.07	25.43
	15 cm. (S ₃)	23.67	24.98	26.82	26.72	27.13	23.53	22.20	25.37	19.17	20.77	21.35	18.05	25.82	24.66	21.20	23.43
Mean over all (S)		25.13	26.60	27.31	28.43	28.82	24.69	24.63	27.92	22.24	23.91	24.13	20.35	28.11	28.07	25.32	25.71
April, 25 (D ₂)	5 cm, (S ₁)	72.51	73.37	71.80	73.67	82.43	75.73	72.92	79.30	71.23	64.03	65.52	66.97	77.23	76.73	67.27	72.71
	10 cm. (S ₂)	70.78	71.80	70.43	70.22	80.03	72.83	69.47	72.22	69.07	60.77	62.30	59.37	73.05	72.10	61.67	69.07
	15 cm. (S ₃)	68.77	69.90	67.80	68.80	78.13	68.93	67.12	69.49	68.30	57.80	60.03	57.67	69.17	70.70	58.87	66.77
Mean over all (S)		70.69	71.69	70.01	70.89	80.20	72.50	69.83	73.67	69.53	60.87	62.62	61.33	73.15	73.18	62.60	69.52
Mean over all (D)	5 cm, (S ₁)	49.69	50.83	49.68	51.94	56.46	50.78	50.16	55.08	48.48	45.77	46.39	45.37	53.94	54.38	48.48	50.50
	1 cm,0(S ₂)	47.82	49.17	48.98	49.29	54.43	48.77	46.88	49.88	45.46	42.12	43.03	39.30	50.46	49.82	42.37	47.82
	15 cm. (S ₃)	46.22	47.44	47.31	47.76	52.63	46.23	44.66	47.43	43.73	39.28	40.69	37.86	47.49	47.68	40.03	46.22
Mean overall (D and S)		47.91	49.14	48.66	49.66	54.51	48.59	47.23	50.80	45.89	42.39	43.37	40.84	50.63	50.63	43.96	

L.S.D 0.05= E=0.608

D=0.595 S=0.219 E×D=0.774

E×S=0.848

D×S=0.310

E×D×S=1.199

Table (6) : Effect of Jew's mallow ecotypes, planting dates and spacing on number of branches/plant in the first summer season 2009.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	2.980	3.450	3.000	3.343	2.557	2.233	3.683	2.377	2.760	3.350	3.497	3.823	2.707	2.443	2.093	2.953
	10 cm, (S ₂)	3.543	3.707	3.400	4.050	3.123	3.643	4.240	2.813	2.910	3.527	3.907	4.347	3.273	3.133	2.717	3.489
	15 cm, (S ₃)	3.927	4.000	3.963	4.450	3.677	3.963	4.553	3.350	3.193	3.750	4.320	4.807	3.840	4.050	3.457	3.953
Mean over all (S)		3.483	3.719	3.454	3.948	3.119	3.280	4.159	2.847	2.954	3.542	3.908	4.326	3.273	3.209	2.756	3.465
April, 25 (D ₂)	5 cm, (S ₁)	3.353	3.557	3.407	3.820	3.133	2.557	3.723	2.940	3.440	4.020	4.377	5.003	3.517	3.457	4.003	3.620
	10 cm, (S ₂)	3.537	3.957	3.857	4.440	3.647	3.820	4.003	3.153	3.447	4.350	4.920	5.200	4.000	3.907	4.450	4.048
	15 cm, (S ₃)	4.150	4.253	4.257	4.707	4.127	4.203	4.700	3.600	3.560	4.783	5.450	5.600	4.717	4.567	4.843	4.501
Mean over all (S)		3.680	3.922	3.840	4.392	3.636	3.527	4.152	3.231	3.482	4.384	4.916	5.268	4.078	3.977	4.432	4.056
Mean over all (D)	5 cm, (S ₁)	3.167	3.503	3.203	3.582	2.845	2.395	3.703	2.658	3.100	3.685	3.937	4.413	3.112	2.950	3.048	3.287
	10 cm, (S ₂)	3.540	3.832	3.628	4.245	3.385	3.732	4.137	2.983	3.178	3.938	4.413	4.773	3.627	3.520	3.583	3.768
	15 cm, (S ₃)	4.038	4.127	4.110	4.578	3.902	4.083	4.668	3.475	3.377	4.267	4.885	5.203	4.278	4.308	4.150	4.227
Mean overall (D and S)		3.582	3.821	3.647	4.135	3.377	3.403	4.156	3.039	3.218	3.963	4.412	4.797	3.676	3.593	3.594	

L.S.D 0.05=

E=0.39 D=0.174 S=0.019 E×D=0.071

E×S=0.073

D×S= 0.072 E×D×S=0.103

Table (7): Effect of Jew's mallow ecotypes, planting dates and spacing on number of branches/plant in the second summer season 2010.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	3.333	3.103	3.233	3.260	2.613	2.107	3.533	3.150	21.943	3.640	3.640	3.893	2.839	2.483	2.243	3.068
	10 cm, (S ₂)	3.777	2.593	3.593	3.983	3.023	2.897	4.113	3.377	3.197	3.797	4.003	4.147	3.250	3.020	2.633	3.427
	15 cm, (S ₃)	4.233	3.400	3.803	4.427	3.527	4.187	4.840	3.443	3.400	3.957	4.420	4.520	3.800	3.483	3.857	3.953
Mean over all (S)		3.781	3.032	3.543	3.890	3.054	3.063	4.162	3.323	3.180	3.798	4.021	4.197	3.296	2.996	2.911	3.483
April, 25 (D ₂)	5 cm, (S ₁)	3.250	3.440	3.317	3.403	3.053	3.783	3.790	2.897	3.210	3.790	4.360	5.003	3.423	3.460	4.050	3.617
	10 cm, (S ₂)	3.923	4.003	3.847	4.200	3.457	3.500	4.333	3.550	3.520	4.213	4.753	5.147	3.810	4.000	4.310	4.038
	15 cm, (S ₃)	4.317	4.633	4.377	4.967	4.510	4.500	4.850	3.750	3.687	4.657	5.200	5.523	4.167	4.610	4.837	4.572
Mean over all (S)		3.830	4.026	3.847	4.190	3.673	3.928	4.324	3.399	3.472	4.220	4.771	5.234	3.800	4.023	3.399	4.076
Mean over all (D)	5 cm, (S ₁)	3.292	3.272	3.275	3.332	2.833	2.945	3.662	3.023	3.077	3.715	4.000	4.463	3.130	2.972	3.147	3.342
	10 cm, (S ₂)	3.850	3.298	3.720	4.092	3.240	3.198	4.223	3.463	3.358	4.005	4.378	4.647	3.530	3.510	3.472	3.732
	15 cm, (S ₃)	4.275	4.017	4.090	4.697	4.018	4.343	4.845	3.597	3.543	4.307	4.810	5.022	3.983	4.047	4.347	4.263
Mean overall (D and S)		3.806	3.529	3.695	4.040	3.364	3.496	4.243	3.361	3.326	4.009	4.396	4.711	3.548	3.509	3.655	

L.S.D 0.05= E=0.137 D=0.330 S=0.067 E×D=0.270

E×S=0.261

D×S= NS

E×D×S=0.369

Table (8): Effect of Jew's mallow ecotypes, planting dates and spacing on green leaf yield (ton/Fed.) in the first summer season 2009.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	2.025	1.855	1.896	1.990	1.750	1.665	2.610	1.455	1.547	1.563	1.745	1.301	2.120	1.668	2.160	1.823
	10 cm, (S ₂)	1.788	1.398	1.491	1.608	1.420	1.400	1.912	1.210	1.250	1.200	1.433	1.022	1.802	1.310	1.740	1.466
	15 cm, (S ₃)	1.402	1.245	1.067	1.240	1.137	1.220	1.390	1.002	1.050	1.050	1.250	0.850	1.500	1.023	1.205	1.179
Mean over all (S)		1.739	1.499	1.488	1.613	1.448	1.428	1.971	1.222	1.282	1.271	1.476	1.058	1.807	1.334	1.702	1.489
April, 25 (D ₂)	5 cm, (S ₁)	5.650	4.917	4.240	4.900	5.310	5.412	5.600	5.703	5.700	6.147	4.750	5.690	4.720	4.602	5.850	5.279
	10 cm, (S ₂)	4.860	4.303	3.783	4.300	5.062	4.700	4.710	5.007	5.068	5.400	4.008	5.038	4.153	4.050	5.150	4.640
	15 cm, (S ₃)	4.240	3.747	3.302	4.050	4.750	4.153	4.00	4.502	4.600	4.602	3.400	4.720	3.750	3.800	4.670	4.152
Mean over all (S)		4.917	4.322	3.775	4.417	5.041	4.755	4.770	5.071	5.123	5.383	4.053	5.149	4.205	4.151	5.223	4.690
Mean over all (D)	5 cm, (S ₁)	3.838	3.386	3.068	3.445	3.530	3.538	4.105	3.579	3.624	3.855	3.248	3.496	3.420	3.135	4.005	3.551
	10 cm, (S ₂)	3.324	2.851	2.637	2.9564	3.241	3.050	3.311	3.108	3.159	3.300	3.721	3.030	2.978	2.680	3.445	3.053
	15 cm, (S ₃)	2.821	2.496	2.189	2.645	2.962	2.687	2.695	2.752	2.825	2.826	2.325	2.785	2.625	2.412	2.938	2.665
Mean overall (D and S)		3.328	2.911	2.631	3.015	3.244	3.092	3.370	3.146	3.203	3.327	2.765	3.104	3.008	2.742	3.463	

L.S.D 0.05=

E=0.023 D=0.119 S=0.009 E×D=0.026

E×S=0.034

D×S=0.012

E×D×S=0.048

Table (9): Effect of Jew's mallow ecotypes, planting dates and spacing on green leaf yield (ton/Fed.) in the second summer season 2010.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	1.792	1.868	1.753	2.099	1.856	1.692	2.510	1.610	1.408	1.602	1.800	1.403	2.200	1.700	1.857	1.810
	10 cm, (S ₂)	1.452	1.417	1.393	1.700	1.500	1.567	1.930	1.210	1.270	1.253	1.460	1.050	1.678	1.261	1.800	1.463
	15 cm, (S ₃)	1.142	1.273	1.197	1.353	1.253	1.250	1.405	1.050	1.110	1.082	1.270	0.900	1.560	1.030	1.313	1.213
Mean over all (S)		1.462	1.519	1.448	1.717	1.536	1.503	1.948	1.290	1.263	1.271	1.476	1.058	1.807	1.334	1.702	1.495
April, 25 (D ₂)	5 cm, (S ₁)	5.542	4.757	4.298	5.100	5.492	5.460	5.710	5.750	5.880	6.203	5.010	5.750	4.800	4.660	5.910	5.353
	10 cm, (S ₂)	4.892	4.190	3.800	4.622	5.008	4.610	4.810	5.110	5.200	5.510	4.203	5.060	4.200	4.110	5.202	4.702
	15 cm, (S ₃)	4.303	3.860	3.353	4.147	4.802	3.953	4.050	4.600	4.710	4.710	3.603	4.803	3.810	3.845	4.705	4.217
Mean over all (S)		4.912	4.269	3.817	4.623	5.101	4.674	4.857	5.153	5.263	5.383	4.053	5.149	4.208	4.151	5.223	4.758
Mean over all (D)	5 cm, (S ₁)	3.667	3.313	3.026	3.600	3.674	3.576	4.110	3.680	3.644	3.903	3.405	3.577	3.500	3.180	3.883	3.582
	10 cm, (S ₂)	3.172	2.802	2.597	3.161	3.254	3.088	3.370	3.160	3.235	3.382	2.832	3.055	2.939	2.686	3.501	3.082
	15 cm, (S ₃)	2.723	2.567	2.275	2.750	3.028	2.602	2.728	2.825	2.910	2.896	2.437	2.852	2.685	2.438	3.009	2.715
Mean overall (D and S)		3.187	2.894	2.633	3.170	3.319	3.089	3.403	3.222	3.263	3.393	2.891	3.161	3.041	3.464		

L.S.D 0.05=

E=0.05 D=0.192S=0.023 E×D=0.078

E×S=0.088

D×S=0.033

E×D×S=0.125

Table (10): Effect of Jew's mallow ecotypes, planting dates and spacing on dry leaf yield (ton/Fed.) in the first summer season 2009.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	0.657	0.650	0.597	0.803	0.700	0.700	0.748	0.592	0.500	0.650	0.650	0.600	0.690	0.730	0.680	0.662
	10 cm, (S ₂)	0.383	0.360	0.310	0.450	0.387	0.395	0.440	0.370	0.300	0.470	0.400	0.340	0.447	0.400	0.475	0.394
	15 cm, (S ₃)	0.292	0.285	0.247	0.353	0.290	0.303	0.373	0.232	0.220	0.360	0.340	0.230	0.370	0.292	0.420	0.306
Mean over all (S)			0.444	0.432	0.384	0.536	0.459	0.466	0.521	0.398	0.340	0.493	0.463	0.390	0.502	0.474	0.507
April, 25 (D ₂)	5 cm, (S ₁)	1.686	1.690	1.520	1.710	1.800	1.950	1.610	1.809	1.755	1.700	1.430	1.900	1.450	1.545	1.490	1.668
	10 cm, (S ₂)	1.040	1.000	0.900	1.120	1.202	1.240	0.950	1.120	1.150	1.160	0.832	1.205	0.900	0.908	1.060	1.051
	15 cm, (S ₃)	0.570	0.502	0.517	0.640	0.890	0.753	0.552	0.667	0.800	0.702	0.490	0.702	0.560	0.530	0.860	0.648
Mean over all (S)			1.099	1.064	0.979	1.157	1.297	1.314	1.037	1.196	1.235	1.187	0.917	1.269	0.970	0.994	1.122
Mean over all (D)	5 cm, (S ₁)	1.171	1.170	1.058	1.257	1.250	1.325	1.179	1.197	1.128	1.175	1.040	1.250	1.070	1.138	1.066	1.165
	10 cm, (S ₂)	0.712	0.680	0.605	0.785	0.794	0.817	0.695	0.745	0.725	0.815	0.616	0.772	0.673	0.654	0.753	0.723
	15 cm, (S ₃)	0.431	0.393	0.382	0.497	0.590	0.528	0.463	0.449	0.510	0.531	0.415	0.466	0.465	0.411	0.625	0.477
Mean overall (D and S)		0.771	0.748	0.682	0.682	0.846	0.878	0.890	0.779	0.797	0.788	0.690	0.829	0.736	0.734	0.815	0.815

L.S.D 0.05= E=0.010 D=0.078 S=0.004 E×D=0.011

E×S=0.015

D×S= 0.005 E×D×S=0.021

Table (11) : Effect of Jew's mallow ecotypes, planting dates and spacing on dry leaf yield (ton/Fed.) in the second summer season 2010.

Planting dates (D)	Spacing (S)	Ecotypes (E)															Mean over all (E)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Feb, 25 (D ₁)	5 cm, (S ₁)	0.658	0.677	0.603	0.843	0.720	0.718	0.758	0.605	0.512	0.660	0.660	0.597	0.708	0.750	0.680	0.677
	10 cm, (S ₂)	0.392	0.382	0.337	0.467	0.412	0.402	0.460	0.375	0.313	0.458	0.405	0.350	0.460	0.410	0.475	0.406
	15 cm, (S ₃)	0.300	0.300	0.260	0.372	0.305	0.320	0.450	0.242	0.232	0.372	0.350	0.250	0.383	0.307	0.420	0.324
Mean over all (S)		0.450	0.453	0.400	0.561	0.479	0.480	0.556	0.407	0.352	0.497	0.472	0.399	0.517	0.489	0.525	0.469
April, 25 (D ₂)	5 cm, (S ₁)	1.688	1.700	1.547	1.735	1.822	1.970	1.625	1.820	1.773	1.720	1.450	1.922	1.490	1.570	1.490	1.688
	10 cm, (S ₂)	1.070	1.007	0.933	1.213	1.230	1.260	0.955	1.120	1.160	1.170	0.850	1.230	0.912	0.920	1.060	1.073
	15 cm, (S ₃)	0.580	0.513	0.530	0.649	0.902	0.770	0.560	0.680	0.820	0.718	0.505	0.715	0.567	0.543	0.860	0.661
Mean over all (S)		1.113	1.073	1.003	1.199	1.318	1.333	1.047	1.207	1.251	1.203	0.935	0.289	0.989	1.011	1.137	1.141
Mean over all (D)	5 cm, (S ₁)	1.173	1.188	1.075	1.289	1.271	1.344	1.192	1.213	1.143	1.190	1.055	1.259	1.099	1.160	1.085	1.182
	10 cm, (S ₂)	0.731	0.694	0.635	0.840	0.821	0.831	0.708	0.748	0.737	0.814	0.628	0.790	0.686	0.665	0.768	0.740
	15 cm, (S ₃)	0.440	0.407	0.395	0.511	0.603	0.545	0.505	0.461	0.526	0.545	0.428	0.483	0.475	0.425	0.640	0.493
Mean overall (D and S)		0.781	0.763	0.702	0.880	0.898	0.907	0.801	0.807	0.802	0.850	0.703	0.844	0.753	0.750	0.831	

L.S.D 0.05=

E=0.011

D=0.092

S=0.005 E×D=0.017

E×S=0.020

D×S=0.007

E×D×S=0.029

Discussion

The study was carried out in the vegetable farm of South Valley University to study the effect of ecotypes, planting date and spacing on some yield traits of Jew's mallow (*Corchorus olitorius*, L.). The seeds were sown in tow planting dates i.e., Feb, 20th and April 20th during the 2009 and 2010 seasons. The experiment included 15 ecotype collected from diverse regions of Egypt, three distances (5, 10 and 15 cm between plants).

Total yield is the most important character to be looked at, since it expresses the crop economic value. This character has many inputs through the other yield component characters i.e., number of branches/ plant, plant height, leaf yield... etc. in this study 15 ecotypes were tested in two planting dates and three spacing. There were significant differences among 15 ecotypes in both seasons. Ecotype no. 9 (Balady Sohag) and no. 5 (Balady El-Behera) gave the highest total yield in both seasons.

Ecotype no. 12 (Balady Alexandria) and ecotype no. 11 (Balady El-Menia) for number of branches / plant. Ecotype no. 5 (Balady el-Behera) gave the highest fresh leaf yield, dry leaf yield and longest plait in both seasons. Ecotype No. 8 (Balady Qena) for plant height and ecotype No. 6 (Balady Beni Suef) for leaf dry yield in both seasons. This results was similar to differences among ecotypes (as differences among genotypes) were reported by

several investigators in many vegetable crops under Upper Egypt condition. Similar findings were reported by Abdel-Naser (1996) for Okra local ecotypes. In Jew's mallow, Kheraba (1980), in Egypt found differences between ecotypes. Similar results were reported by Khandakar et al., (1988), Chakraborty et al., (1991) and Bokaria and Sasmal (1994).

Planting date is major affecting Jew's mallow production, Muesey and El-Murabaa (1960). The presented data in this study suggested that all ecotypes consistently had increases in number of branches per plant, plant height, total fresh yield, green leaf yield and dry leaf yield when they were grown on planting date (April 25) compared with Feb, 25 in both seasons

Similar results were reported by Ali (1996). In Alexandria, Abd-Allah and Naser (2010) suggested that the best date in order to grow Jew's mallow for fresh foliage yield might be on mid of May. In another study, Wahba et al. (2003) reported that sowing Jew's mallow on the 1st of June gave the highest total fresh yield and vegetative growth. Ecotype No. 9 gave the highest total fresh yield followed by ecotype No. 5 when they were grown on April 25 in both seasons, ecotypes No. 12 followed by ecotype No. 11 for number of branches/ plant, ecotype No. 10 for green leaf yield and ecotype no. 6 followed by ecotype No. 5 for dry leaf yield in both seasons. Plant-

ing on Feb. 25, ecotype No. 4 gave the highest total fresh yield and dry leaf yield in both seasons, ecotype No. 12 for number of branches/ plant and ecotype No. 13 for green leaf yield in both seasons. Spacing had a significant effect on all studied traits in both seasons. Close spacing 5 and 10 cm between plants (high density) gave highest value for total fresh yield, green and dry leaf yield and plant height in the two of study. Abd El- Aal (1973) in Sudan, obtained higher yield of Jew's mallow when the seed rate was increased from 1-4 grams per meter square. Also, similar results were reported by Hamdy et al. (1973), Idem (1988) and Bandyopodhyay et al. (1991). Wide spacing (low density). On the other hand, gave the highest values for number of branches/ plant in both seasons. A significant interaction of ecotype \times planting date \times spacing was recorded for total fresh yield, plant height, number of branches/ plant, green and dry leaf yield in both seasons.

Planting on April 25, ecotype no. 9 (Balady Sohag) and 8 (Balady Qena) under close spacing (5 cm between plants) gave the highest total fresh yield, while the ecotype No. 3 (Balady Assuit) gave the lowest value in both seasons. Ecotype No. 5 (Balady El-Behera) gave the longest plant under spacing 5 and 10 cm between plants, while the ecotype No. 12 (Balady Alexandria) gave the shortest plant under spacing (15 cm) in both sea-

sons, ecotype No. 12 under spacing (15 and 10 cm) for number of branches/ plant in both seasons, ecotype No. 10 (wazary) and 15 (New Valley) under spacing (5 and 10 cm between plants) for green fresh yield in both seasons and ecotype No. 6 (Balady Beni Suef) and No. 12 under spacing (5 and 10 cm) on both seasons.

Planting on Feb. 25, ecotype no. 4 (Balady Ismalia) under spacing (5 cm between plants) gave the highest total fresh yield, while the ecotype No. 12 gave the lowest value in both seasons, ecotype No. 14 under spacing (5 cm) followed by ecotype No. 4 under spacing (10 cm) gave the longest plant in both seasons, ecotype No. 12 followed by ecotype No. 7 gave the highest number of branches/ plant under spacing (15 and 10 cm), while ecotype No. 15 gave the lowest value under spacing 5 cm in both seasons.

For green fresh yield, ecotype No. 7 followed by ecotype no. 15 under spacing (5 and 10 cm) gave the highest value, while the ecotype no. 12 gave the lowest value in both seasons, ecotype no. 4 under close spacing (5 cm) gave the highest dry leaf yield in both seasons. These results were in agreement with mentioned by Mursy and El-Murabaa (1960), Also, Ahmed (1996) found that sowing ecotype (balady Khargha) on early summer Feb. (1-5) under close spacing gave highest recorded total fresh yield, while ecotype (Balady El-Monera) under close spacing (5 cm) gave the

highest value in autumn planting October 1-3). Moreover, summer plating (April 11-13) ecotype (Balady Nag Hammady and balady Kattara) under close (5 cm) gave the highest total fresh yield in both seasons.

Conclusions

1- There were significant differences among ecotypes for all studied traits. Ecotype no. 5 (Balady El-Behera) gave the highest value of fresh leaf yield (ton/fed) and plant height, ecotype no. 6 (Balady Beni Suef) for dry leaf yield (ton/fed.) and ecotype no. 9 (Balady Sohag) for total fresh yield (ton/fed.) in both seasons.

2- Sowing on April 25, gave significantly high total fresh yield, green and dry leaf yield, plant height and number of branches/ plant compared with early sowing Feb. 25 in both seasons.

3- The close spacing (5 and 10 cm between plants) gave the high value for total fresh yield, green and dry leaf yield and plant height traits compared with 15 cm spacing in both seasons. The wide spacing 15 cm gave higher number of branches/ plant as compared with the two other spacing in both seasons.

4- Ecotypes no. 12 (Balady Alexandria) under two sowing dates (D1 and D2) and wide spacing (15 and 10 cm between plants) gave the highest number of branches/plant in both seasons.

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تأثير ميعاد ومسافة الزراعة على النمو والمحصول في بعض طرز الملوخية تحت ظروف جنوب الوادي

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أجريت هذه الدراسة بمزرعة كلية الزراعة بقنا - جامعة جنوب الوادي خلال عامي 2009، 2010، وذلك بهدف دراسة تأثير ميعاد ومسافة الزراعة على النمو والمحصول في بعض طرز (ecotypes) الملوخية تحت ظروف جنوب الوادي - حيث تم تجميع عدد 15 طرزاً بيئياً من الملوخية من مناطق مختلفة من مصر، ثم زرعت في ميعادين زراعة (25 فبراير) و 25 إبريل في كل موسم زراعي في كلا الموسمين، وزرعت البذور في سطور المسافة بينها 20 سم، وبعد الإنبات تم خف النباتات على ثلاثة مسافات 5سم، 10سم، 15سم بين النباتات داخل السطر. وكانت النتائج المتحصل عليها على النحو التالي:

1- توجد خلاقات جوهريّة بين الطرز البيئية في جميع الصفات قيد الدراسة في العامين، ولقد أعطى الطراز رقم (9) بلدي سوهاج والطراز رقم (5) بلدي البحيرة أعلى محصول كلي طازج في كلا موسمي الزراعة، بينما أعطى الطراز رقم (12) بلدي الإسكندرية يليه الطراز رقم (11) بلدي المنيا أعلى عدد للأفرع / للنبات في كلا الموسمين. كما أعطى الطراز رقم (5) بلدي البحيرة يليه الطراز رقم (8) بلدي قنا أعلى ارتفاع للنبات في كلا الموسمين، كذلك أعطى الطراز رقم (15) بلدي الوادي الجديد يليه الطراز رقم (7) أسوان أعلى محصول أوراق طازج في كلا الموسمين. والطراز رقم (6) بلدي بني سويف يليه الطراز رقم (5) بلدي بحيرة أعلى محصول أوراق جافة في كلا الموسمين. كما سجل الطراز رقم (3) بلدي أسيوط أقل محصول جاف وكذلك محصول أوراق طازجة في كلا الموسمين، وكذلك الطراز رقم (13) دمياط أقل محصول في كلي طازج في كلا الموسمين.

2- أدت الزراعة في 12 أبريل (ميعاد ثاني) مقارنة بالزراعة في 20 فبراير ميعاد أول إلى زيادة معنوية في صفات كمية المحصول الكلي، وطول النبات، وعدد الأفرع، ومحصول الأوراق الأخضر، والجاف في موسمي الزراعة.

3- وجود خلاقات جوهريّة بين كثافات الزراعة في كلا الموسمين في جميع الصفات قيد الدراسة، فكانت الكثافة العالية 5سم، 10سم أعلى محصولاً في صفات الوزن الطازج الكلي، ومحصول الأوراق الأخضر والجاف، وطول النبات، أما الكثافة المنخفضة فقد أعطت أكبر عدد من الفروع في كلا الموسمين.

4- أعطى الطراز رقم (9) يليه الطراز رقم (5) أعلى كمية محصول كلي طازج في ميعاد الزراعة الثاني (12 أبريل)، والطراز رقم 12 يليه الطراز رقم (11) لصفة عود الأفرع، والطراز رقم (10) في صفة محصول الأوراق الأخضر، والطراز رقم (6) يليه الطراز رقم (5) في صفة المحصول الجاف في كلا الموسمين، بينما حقق الطراز رقم (4) عند زراعته في ميعاد الزراعة الأول 20 فبراير أعلى محصول كلي طازج ومحصول الأوراق الجاف في كلا موسمي

الزراعة، كما أعطى الطراز رقم (12) يليه الطراز رقم (7) أعلى عدد الأفرع، والطراز رقم (7) يليه الطراز رقم (13) في صفة محصول الأوراق الطازج في كلا الموسمين.

5- كانت الطراز رقم (7) بلدي أسوان، (15) بلدي الوادي الجديد تحت الكثافة النباتية العالية كسم أفضل الطرز في محصول الأوراق الطازج يليهم الطراز رقم (10) تحت نفس الكثافة ، بينما الطراز رقم (3) أسويط أقل الطرز تحت الكثافة النباتية المنخفضة 15 سم في كلا الموسمين. كذلك أعطى الطراز رقم (4)، (9) تحت الكثافة النباتية العالية 5 سم أعلى محصول كلي طازج في الموسم الأول والطراز رقم (5) يليه الطراز رقم (8) في الموسم الثاني يليهم الطراز رقم (9)، (5) تحت الكثافة 10 سم في كلا الموسمين، بينما سجل الطراز رقم (8) أقل كمية محصول تحت المسافة 15 سم في كلا موسمي الزراعة. وفي صفة ارتفاع النبات أعطى الطراز رقم (5)، (8) تحت الكثافة العالية كسم، 10 سم أعلى ارتفاع للنبات، بينما سجل للطراز رقم 12 تحت الكثافة 15 سم أقل ارتفاع للنبات في كلا الموسمين.

وفي صفة عدد الأفرع أعطى الطراز رقم (12) أكبر عدد من الأفرع تحت الكثافة النباتية المنخفضة 15 سم، 10 سم يليه الطراز رقم 11 في موسمي الدراسة، بينما الطراز رقم (6) تحت الكثافة النباتية العالية كسم أقل عدد من الأفرع في الموسم الأول والطراز رقم (5) في الموسم الثاني. وفي صفة المحصول الأوراق الجاف أعطى الطراز رقم (6)، (4) أعلى محصول أوراق جفاف تحت كثافة الزراعة العالية كسمك وكذلك تحت الكثافة 10 سم في كلا الموسمين، بينما أعطى الطراز رقم (3) أقل محصول تحت الكثافة النباتية المنخفضة 15 سم في كلا الموسمين.

6- أعطى الطراز رقم (9)، (8) عند زراعته في 20 أبريل وتحت الكثافة النباتية العالية كسم أعلى محصول كلي طازج، بينما أعطى الطراز رقم (3) أقل محصول كلي طازج تحت الكثافة النباتية المنخفضة في كلا الموسمين، وفي صفة طول النبات أعطى الطراز رقم 4 أعلى ارتفاع تحت الكثافة النباتية كسم، 10 سم، بينما أعطى الطراز رقم (12) أقل ارتفاع للنبات تحت الكثافة 15 سم في كلا موسمي الزراعة.

وفي صفة عدد الأفرع أعطى الطراز رقم (12) أعلى عدد من الأفرع تحت الكثافة 15 سم، 10 سم في كلا الموسمين، بينما سجل الطراز رقم (6) أقل عدد من الأفرع تحت الكثافة 5 سم في الموسم الأول والطراز رقم (2) في الموسم الثاني. كما أعطى الطراز رقم (10)، (15) تحت الكثافة النباتية كسم، 10 سم أعلى محصول للأوراق الخضراء، بينما سجل الطراز رقم (3) أقل محصول في العامين وفي صفة المحصول الأوراق الجاف أعطى الطراز رقم (6) يليه الطراز رقم (12) تحت الكثافة النباتية كسم، 10 سم أعلى محصول أوراق جافة، بينما أعطى الطراز رقم (11) أقل كمية محصول تحت الكثافة 15 سم في كلا الموسمين.

7- وفى ميعاد الزراعة الأول 25 فبراير، أعطى الطراز رقم (4) أعلى محصول كلى طازج تحت الكثافة النباتية العالية 5 سم، بينما أعطى الطراز رقم (12) أقل محصول تحت الكثافة النباتية المنخفضة 15 سم في كلا الموسمين. كما أعطى الطراز رقم (14) تحت الكثافة النباتية 5سم يليه الطراز رقم (4) تحت الكثافة النباتية 10سم أعلى ارتفاع لطول النبات، بينما أعطى الطراز رقم (12) أقل ارتفاع لطول النبات في كلا الموسمين، وفى صفة عدد الأفرع أعطى الطرازان (12)، (7) أعلى عدد للأفرع تحت الكثافة النباتية 15سم، 10سم، بينما أعطى الطراز رقم (15) تحت الكثافة 5سم أقل عدد من الأفرع في الموسمين. وفى صفة محصول الأوراق الأخضر، أعطى الطراز رقم (7) يليه الطراز رقم 10 أعلى محصول أوراق خضراء طازجة تحت الكثافة النباتية 5سم، 10سم، بينما سجل الطراز رقم (12) تحت الكثافة النباتية أقل كمية محصول أوراق خضراء في كلا الموسمين. أعطى الطراز رقم (4) يليه الطراز رقم (7) والطراز رقم (14) أعلى محصول أوراق جافة تحت الكثافة النباتية العالية 5سم، يليهم الطراز رقم (15)، (14) تحت الكثافة 10سم، بينما أعطى الطراز رقم (9) أقل كمية محصول أوراق جافة في العامين.