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PERFORMANCE OF FENCES ON THE PROTECTION OF ALFALFA GROWN AT SIWA AEOLIAN SAND

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ABSTRACT

The experiment was implemented in aeolian sand deposits at Siwa Oasis, Western Desert of Egypt, during 2004/2005 to study the performance of fences types for protection and productivity of alfalfa crop. Fences of single and double rows of palm leaves were investigated as well as their distance from the alfalfa fields i.e. (10, 20,30and 40m). Sand collectors were used for quantity and monitor the shifting sand in front and behind the fences. The combination of double rows fence and 10,20m distance gave superior growth characters and yield of alfalfa, while the best protection was occurred with the fence of double rows and 20m distance. This treatment decreased the wind speed and trapped most of sand drift which encroachment of alfalfa crop.

Keyword: Aeolian sand deposits, fence, windbreaks, checkerboard, Alfalfa, sand collectors, sand encroachment control, sand accumulation.

INTRODUCTION

The aeolian sand deposits are dominant phenomena in the arid regions. In Egypt, such areas cover 16% of the total surface area. The major portion of this area (95%) is located in western desert. Siwa Oasis is a natural depression of the western desert, it located at the northern edge of the Great Sand Sea. Agriculture land, irrigation system and drainage network are subjected to sand encroachment. It is true problem in Siwa Oasis. Few local trials such as fencing, windbreaks and cultivation of some plant species, have been used to control sand encroachment. Some trials to stabilize sand encroachment had been executed at 17 km to the west of Siwa. Draz and Missak (1992) indicated that establishment of successive mechanical fences in the transportation zone decrease the wind velocity and limit the sand supply from the source zone. Natural resources of plant materials such as palm leaves, reeds, dry plant residues are using temporary sand dune fixation. Zhang, *et al.* (2004) showed that, for corn straw fencing, wheat straw construction checkerboard system and planting *Artemisia halodendron*, have significant increases plant species diversity, vegetation cover, aboveground biomass and belowground biomass. Also, control of moving sand dunes caused enrichment the natural plants. Olsen (1985) reported that the average increase in yield up to distance of 20 times the height of the hedge amounts to the following result: barley 5.6%, rye 4.5% - fodder beets 14.6% turnips 6.4% - potatoes 9.2% and clover grass 11.0%. Qiu , *et al.* (2004) showed that sand dune fixation with straw checkerboard technology proved both them icoenvironment condition and the stability of the dune surface.

The aim of this work `was to study the model of fences and the best distance to obtain the best protection of the alfalfa crop.

MATERIALS AND METHODS

This work was designed to study the performance of fences to protect the alfalfa crop at Siwa research station (Khamisa farm) during the period 2004 to 2005.

Two factors for protection alfalfa crop were designed. The first factor consisted of two types of palm leaves fences as follows:- single row of fence – double rows of fences as one unit 10m apart and open area as control of date palm leaves, 72 m length, 2 m height and 35 % porosity. The fences were constructed vertical to dominant wind direction. The second factor was the distance from the fences to the alfalfa crop. The distances treatments were far 10, 20,30and40m from the fence.

Sand collectors were fixed before and after fence treatments to study the efficiency of fences for sand encroachment control (Bagnold, 1971). Alfalfa seed were broadcasted on October 20th 2004. The agricultural practices were applied by adding 10m^3 sheep dung manure+150 kg super phosphate (15.5% P_2O_5)+50 kg ammonium sulphate (20.5% N). Four cuts were obtained of alfalfa crop. The first cut was after 60 days from sowing date, the second cut was after 60 days from the first one, third cut was obtained after 50 days from the second cut and the fourth cut was after 45 days from the third cut.

1- The growth characters and forage yield are studied as follows:-
- Plant height (cm) from cutting level to the junction the top most leaf.
- Number of brunches per plant.
- Fresh and dry weight per plant.
- Number of alfalfa stems per one meter square at every cut, which was determined by using 0.5m^2 wooden frame. Estimation was made four times in each plot and their sum gives the number of stems/m^2.
- Dry matter (DM) percentage for alfalfa in each cut, 200g random green sample was taken from each plot. Samples were oven dried and the DM% was then calculated.
- Green forge yield (ton/fed) was determined for all cuts on the whole plot basis.
- Dry forge yield (ton/fed) was calculated as follows: green forge yield (ton/fed) x dry matter percentage.

2- `Amount of sands in sand collectors were monthly weighed during the period ranged from October 2004 to September 2005.

3- `The amount of sand collected was used as indicator to determine the efficiency of trapping sand drift and protecting alfalfa field.

- The Fence efficiency (%): It was calculated using the following Formula $= \frac{A-B}{A} \times 100$ Where:

A= sand accumulation (gm/cm width) in front of fences.

B= sand accumulation behind fences.

4- The chemical composition of both water used for irrigation and Aeolian sand deposits are presented in Table 1,2 by (FAO, 1970), respectively.

5- Average of climatic factors during the growth period is presented in Table (3).

6- The experiment design was a split plot design with four replications. The plot area was $10.5m^2$. The main plots were assigned to fences types and the sub plot were occupied by the four distances between plant and fences

7- All data were subjected to the analysis of variance according to the method described by Snedecor and Cochran (1980). Regression coefficient was estimated according to (Harvey, 1987).

Table (1): Chemical analysis of irrigation water.

Characters / Seasons	Irrigation water analysis									
	EC ds/m^{-1}	P^H	Ca^{++}	Mg^{++}	K^+	Na^+	$CO_3^=$	HCO_3^-	Cl^-	$SO_4^=$
Summer	11.18	7.07	42.40	12.52	2.04	82.01	-	8.05	89.29	41.62
Winter	8.63	7.11	29.22	8.63	1.92	67.20	-	5.60	61.54	39.80

Table (2): Chemical analysis of the Aeolian sand deposits.

EC ds/m^{-1}	Cations me/l					Anions me/l				CaCO$_3$ %	Texture class
	P^H	Ca^{++}	Mg^{++}	K^+	Na^+	$CO_3^=$	HCO_3^-	Cl^-	$SO_4^=$		
0.9	7.8	4.8	1.2	0.1	2.7	-	4.3	3.2	1.4	10	Medium to fine Sand

Table (3): Average metrological data of Siwa Oasis.`

Months	Air temperature			Soil temperature			Relative humidity %	Rain full (mm/s)	Evaporation (mm day^{-1})	Mean Wind speed (knot)	Wind direction
	Max	Min	Aver	Depth 5cm	Depth 10 cm	Depth 20 cm					
January	19.7	4.1	11.9	20.7	19.9	20.6	53	0.8	6.0	5.7	W
February	21.7	5.5	13.6	21.5	20.3	21.1	46	2.0	7.9	6.4	W
March	25.1	8.2	16.7	25.1	24.3	24.8	40	0.7	10.7	7.5	W
April	29.8	12.2	21.0	32.4	31.5	32.8	34	0.9	14.1	7.7	W
May	34.2	16.6	25.4	37.5	36.0	37.2	30	1.5	16.1	6.9	N.N.W
June	37.3	19.4	28.4	41.5	40.4	38.8	31	0.0	17.0	6.2	N.N.W
July	37.9	20.4	29.3	42.4	41.5	39.6	34	0.0	16.8	6.1	N.N.E
August	37.8	20.6	29.2	41.6	40.9	39.7	36	0.0	15.2	5.2	N.N.E
September	35.1	18.3	26.7	37.9	37.6	37.3	42	0.0	12.1	4.9	N.N.E
October	31.8	14.8	23.3	34.2	33.8	33.7	45	0.3	9.6	4.2	N.N.E
November	26.4	10.2	18.3	27.8	27.2	27.9	51	0.6	7.0	5.1	W
December	21.4	5.8	15.3	21.2	21.2	22.2	58	2.8	5.2	5.0	W

Source: Meteorological Authority, Cairo.

RESULTS AND DISCUSSION

I- Effect of fences and distances on the growth characters and yield:

I-I- Effect of fences:

Data in Table (4) indicate that the fences significantly increased growth characters and yield i.e, plant height, No. of branches/plant, total. fresh weight and dry weight/plant, No. of alfalfa stem/m², dry matter %, green and dry forage yield compared control (without fences). The increase of the forage yield during the four cuts was due to protection action of fences to the alfalfa plants. However, the double fences were superior than the single fence in the increase of the forage yield. Similar results were obtained by (Taichi *et al.*, 1994) who indicated that the effects of the use of double rows fences on the decrease of the wind velocity and on climatic improvement were cumulative in comparison with the effect of a single row of fence. This may be due to the effect of fences which minimize the sand drift and sand encroachment towards the plants. Moreover, the fences have improved the environmental condition, which gave the chance to the plant to growth well. (Frank and Willis, 1972) indicated that the existing of fences had the same effect.

Table (4): Effect of fences types on growth, yield component and forage yield of alfalfa in aeolian deposits at Siwa.

Fences	Growth parameters				Yield component		Yield	
	Plant height (cm)	No. of branches / plant	Fresh weight / plant/ (g)	Dry weight /plant (g)	No. of stem/ m²	Dry matter content %	Green forage yield (ton/fed)	Dry forage yield (ton/fed)
1st cut								
Without	35.5	-	3.30	0.476	279.80	15.20	5.07	0.766
1 Fence	42.7	-	4.22	0.682	303.10	16.90	6.47	1.100
II fences	48.0	-	4.85	0.776	337.00	18.40	7.42	1.368
L.S.D. 0.05	1.5	-	0.19	0.010	2.03	0.12	0.08	0.009
2nd cut								
Without	41.5	2.11	3.45	0.575	387.00	19.70	6.50	1.241
1 Fence	49.0	2.75	4.25	0.695	485.00	20.90	7.96	1.673
II fences	53.0	3.22	5.02	0.847	534.00	22.30	8.63	1.932
L.S.D. 0.05	1.1	0.06	0.12	0.056	2.45	0.10	0.06	0.006
3rd cut								
Without	42.5	2.52	2.61	0.648	419.00	20.75	7.39	1.534
1 Fence	51.0	3.18	4.48	0.862	526.30	22.30	9.05	2.024
II fences	52.3	3.57	5.22	0.935	554.20	23.05	9.44	2.184
L.S.D. 0.05	0.5	0.14	0.13	0.007	17.20	3.17	0.46	0.075
4th cut								
Without	47.0 c	2.90 c	2.90 c	0.90 c	459.6 c	21.35 c	8.45 c	1.80 c
1 Fence	54.3 b	3.80 b	5.06 b	1.08 b	573.25 b	22.95 b	9.90 b	2.27 b
II fences	54.8 a	3.90 a	5.60 a	1.80 a	602.25 a	24.03 a	10.80 a	2.80 a
L.S.D. 0.05	0.87	0.07	0.06	0.08	16.35	0.44	0.05	0.19

I- II- Effect of distance:

Increasing distance level from the fence significantly decrease plant height, No. of branches/plant, total fresh and dry weight/plant, No. of alfalfa stem, dry matter %, green and dry forage yield, (Table, 5). Regression coefficient (Fig 1 and 2) showed that negative effect between the distance and yield, this indicating that yield increase as the distance decrease and the contrary is true. The treatment of 20 m gave the highest values compared with the other treatments in the most characters in the four cuts. On the other hand, no significant increase between 10, 20 m treatments, however, there are significant decrease between 20 m treatment and 30, 40 m treatments in all studied characters. These may be due to decrease of wind speed until 20 m .These results are in harmony with that obtained by (Olsen, 1985 and Mann ,1985).

Table (5): Effect of distance on growth, yield component and forage yield of alfalfa in aeolian deposits at Siwa Oasis.

Distance (m)	Growth parameters				Yield component		Yield	
	Plant height (cm)	No. of branches/ plants	Fresh weight/ Plant (g)	Dry weight/ plant/ (g)	No. of stem/ m²	Dry matter content (%)	Green forage yield (ton/fed)	Dry forage yield (ton/fed)
1^{st} cut								
10	44.7	-	4.43	0.704	320.00	17.40	6.64	1.173
20	45.0	-	4.25	0.691	320.00	17.50	6.60	1.175
30	39.7	-	3.98	0.595	293.30	16.40	6.06	1.003
40	39.0	-	3.83	0.588	290.30	16.00	5.98	0.960
L.S.D. 0.05	0.7	-	0.36	0.007	0.51	0.18	0.09	0.01
2^{nd} cut								
10	49.3	2.76	4.00	0.770	472.00	21.50	8.76	1.798
20	49.6	2.74	4.07	0.770	482.00	21.50	8.15	1.767
30	46.7	2.64	3.93	0.642	465.00	20.60	7.05	1.458
40	45.7	2.64	3.83	0.640	455.00	20.40	7.02	1.438
L.S.D. 0.05	1.1	0.07	0.07	0.007	5.36	0.12	0.04	0.007
3^{rd} cut								
10	49.3	3.23	4.24	0.843	511.00	22.50	9.23	2.096
20	49.3	3.20	4.25	0.838	507.00	22.50	9.16	2.073
30	48.0	3.00	3.96	0.795	496.00	21.60	8.20	1.781
40	47.7	2.93	3.97	0.783	485.00	21.50	7.93	1.706
L.S.D 0.05	0.2	0.18	0.08	0.005	2.77	2.53	1.20	0.103
4^{th} cut								
10	53.0	3.6	4.6	1.3	548.30	23.17	10.33	2.531
20	52.7	3.6	4.7	1.3	550.70	23.10	10.33	2.402
30	51.0	3.5	4.4	1.2	551.08	22.5	9.24	2.203
40	51.3	3.4	4.4	1.3	530.00	22.3	8.97	2.004
L.S.D 0.05	2.10	0.15	0.12	0.04	18.89	0.34	0.26	0.17

I-III- Effect of the interaction between fences and distance:

The results in Table (6) indicate clearly that the interaction effect between fences and distance was significant on plant height and total fresh weight/plant in the 1^{st} cut and No. of branches/plant, dry weight/plant, No. of alfalfa stem/m² in the 2^{nd} cut. Also, plant height, total fresh and dry weight in the 3^{rd} cut and total fresh and dry weight, dry matter, green and dry forge yield in the 4^{th} cut. Generally, the combination of double fences and 10, 20 m distance gave the highest values for the respective characters. However, the control treatment and 40 m distance gave the lowest values in most characters. Forage and dry yield showed significant effect due to the distance and fences. However, the value of the forage and dry yield were superior up to 20m distance and double fence.

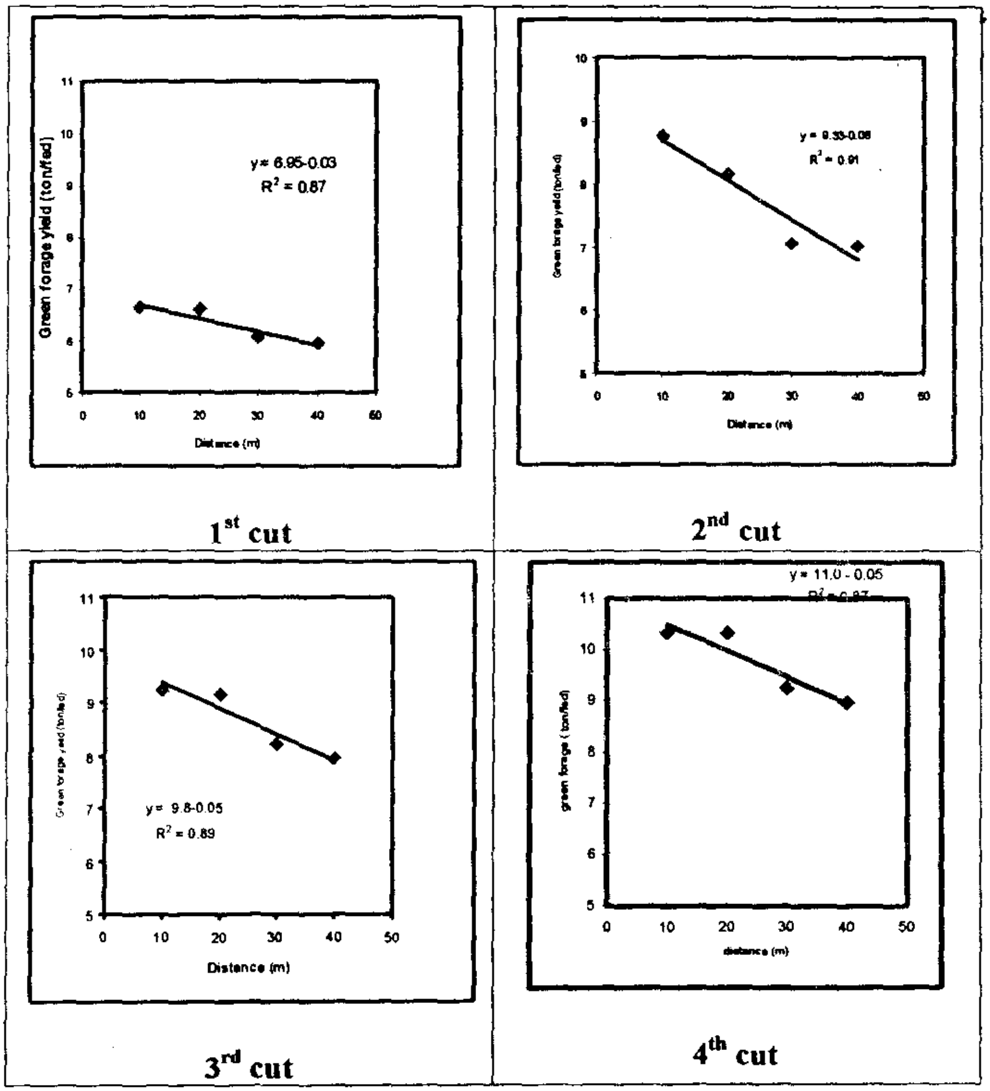

Fig. (1): Regression coefficient between distance and green forage yield

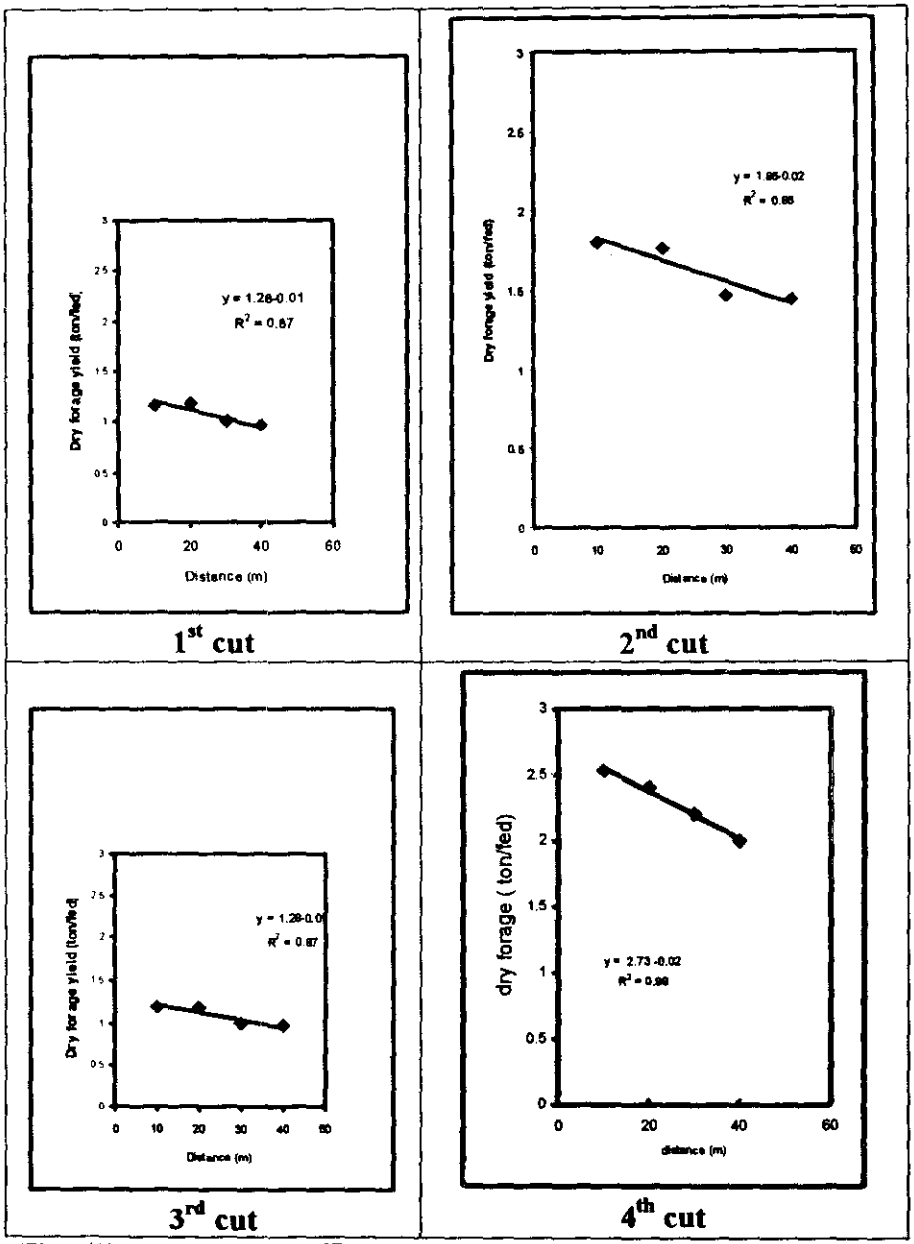

Fig. (2): Regression coefficient between distance and dry forage yield

Table (6): Interaction effect between fences and distances on growth, yield component and forage yield of alfalfa in aeolian deposits at Siwa.

Fences	Distance (m)	Growth parameters				Yield component		Yield	
		Plant height (cm)	No. of branches /plants	Fresh weight /plant (g)	Dry weight/ plant (g)	No. of stem/ m²	Dry matter content (%)	Green forage yield (ton/fad)	Dry forage yield (ton/fed)
				1st cut					
Without	10	38	-	3.50	0.470	299.0	15.4	5.1	0.785
	20	34	-	3.25	0.465	299.0	15.2	5.21	0.777
	30	34	-	3.35	0.485	261.0	15.1	4.97	0.750
	40	36	-	3.10	0.485	260.0	15.1	4.98	0.751
I-fence	10	50	-	4.30	0.730	301.0	17.7	6.99	1.237
	20	45	-	4.50	0.698	312.0	17.9	6.90	1.235
	30	40	-	4.10	0.650	300.0	16.1	6.10	0.982
	40	36	-	4.00	0.651	300.0	16.0	5.90	0.944
II-fences	10	46	-	5.50	0.914	360.0	19.1	7.83	1.496
	20	56	-	5.00	0.909	349.0	19.4	7.80	1.513
	30	45	-	4.50	0.650	319.0	17.9	7.13	1.276
	40	45	-	4.40	0.630	320.0	17.2	6.90	1.186
L.S.D 0.05		2.0	-	0.30	N.S	N.S	N.S	N.S	N.S
				2nd cut					
Without	10	40	2.20	2.40	0.560	383.0	19.6	6.61	1.295
	20	41	2.20	2.50	0.565	386.0	19.8	6.54	1.295
	30	42	2.05	2.50	0.585	390.0	19.9	6.01	1.196
	40	43	2.00	2.40	0.588	390.0	19.6	6.0	1.176
I Fence	10	50	2.80	4.50	0.770	495.0	21.8	8.41	1.840
	20	50	2.71	4.50	0.769	499.0	21.9	8.10	1.774
	30	48	2.73	4.00	0.620	476.0	20.1	7.69	1.546
	40	48	2.77	4.00	0.621	471.0	20.0	7.66	1.532
II fences	10	58	3.30	5.10	0.980	540.0	22.9	9.86	2.258
	20	58	3.30	5.20	0.976	561.0	22.8	9.80	2.234
	30	50	3.15	5.30	0.720	530.0	21.9	7.46	1.633
	40	46	3.15	5.10	0.711	506.0	21.7	7.40	1.606
L.S.D 0.05		N.S	1.10	N.S	0.160	99.6	N.S	N.S	N.S
				3rd cut					
Without	10	42	2.60	2.62	0.650	418.0	20.8	7.42	1.543
	20	43	2.60	2.63	0.645	419.0	20.8	7.38	1.535
	30	43	2.50	2.60	0.650	419.0	20.7	7.40	1.532
	40	42	2.40	2.61	0.650	420.0	20.7	7.38	1.528
I- Fence	10	52	3.30	4.71	0.890	545.0	22.9	9.80	2.244
	20	52	3.30	4.81	0.890	530.0	22.8	9.80	2.234
	30	50	3.10	4.20	0.840	520.0	21.9	8.40	1.839
	40	50	3.00	4.20	0.830	510.0	21.7	8.20	1.779
II-fences	10	54	3.80	5.40	0.990	570.0	23.9	10.46	2.500
	20	53	3.70	5.30	0.980	571.0	23.8	10.30	2.451
	30	51	3.40	5.10	0.895	550./0	22.4	8.80	1.971
	40	51	3.40	5.10	0.870	526.0	22.1	8.20	1.812
L.S.D 0.05		0.4	N.S	0.10	1.840	N.S	N.S	N.S	0.070

N.S=Non significant

Table (6): Cont.

Fences	Distance (m)	Growth parameters				Yield component		Yield	
		Plant height (cm)	No. of branches/plants	Fresh weight/ plant/ (g)	Dry weight/ plant/ (g)	No. of stem/ m²	Dry matter content (%)	Green forage yield (ton/fed)	Dry forage yield (ton/fed)
4th cut									
Without	10	48	2.9	2.91	0.948	450	21.5	8.53	1.834
	20	48	2.9	2.95	0.941	452	21.9	8.48	1.789
	30	48	3.0	2.90	0.950	452	21.3	8.40	1.789
	40	46	2.9	2.91	0.950	451	21.2	8.38	1.777
I- Fence	10	55	3.8	5.21	1.140	585	23.1	10.50	2.426
	20	55	3.9	5.31	1.150	588	23.1	10.50	2.426
	30	53	3.7	4.90	1.010	570	22.9	9.40	2.153
	40	54	3.6	4.82	1.000	550	22.7	9.20	2.088
II-fences	10	56	4.0	5.81	1.810	610	24.9	11.95	3.334
	20	55	4.1	5.82	1.800	612	24.8	11.99	2.974
	30	54	3.8	5.40	1.720	598	23.4	9.88	2.312
	40	54	3.6	5.40	1.710	589	23.0	9.32	2.144
L.S.D 0.05		N.S	N.S	021	0.05	N.S	1.4	0.65	0.253

N.S: Non significant.

II- Effect of fences, distance and their interactions on sand accumulation:

II-1- Effect of fences:

Data in Table (7) and Fig (3) show that the regression coefficient of sand accumulation for fence treatments were significantly decreased compared the control (without fence). Double fences resulted the lowest values compared with the single fence however, the control treatment gave the highest value in sand deposits. The efficiency of fences on sand accumulation were 43.8 and 54.2% for single and double fences, respectively. These results due to the high efficiency of double fence in decrease of the wind velocity. Similar results were obtained by (Martin, 1985) who indicated that the efficiency of fences depended on the height and porosity.

II-II- Effect of distance:

Data in Table (8) and Fig (4) show that the regration coefficient was significantly different between 10, 20 m distance and 30, 40m treatments in all months. The differences were insignificant between the 10 and 20m.

However, there were no trends in the differences between 30 and 40m during the period of the experiment. The 10 m treatment gave the lowest values in sand deposits, whereas, 40 m treatment resulted the highest values in all months. The efficiency of distances were 43.8, 43.7,28.1 and 22.7 % for 10,20,30 and 40m, respectively. These results may be due to the decrease of wind speed in the 10 and 20 m compared with the other treatments! The near distance of fences improved of the climatic conditions of arid lands and prevention desertification process. (Taichi *et al.*, 1994).

II-III- Effect of interaction:

Regarding the interaction efficiency, data in Table (9) showed that the treatments of double fence with 10 or 20m distance gave the highest records of

Table (7): Effect of fences of palm leaves on the sand accumulation (gm/cm width).

Fences	Oct. 2004	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	March 2005	April 2005	May 2005	June 2005	July 2005	August 2005	Sept. 2005	Efficiency fences%
Without	-	33.0	26.5	33.5	51.3	35.3	34.0	35.1	75.0	66.7	25.8	-	100.0
1Fence	-	18.5	8.0	15.8	25.5	15.0	18.7	19.7	50.0	50.0	13.0	-	143.8
II fences	-	15.3	6.0	14.0	22.7	13.5	13.5	14.5	41.6	40.0	10.2	-	154.2
L.S.D 0.05	-	2.2	2.9	0.7	1.1	1.1	0.9	1.9	11.4	11.1	2.9	-	

Table (8): Effect of distances on the sand accumulation (gm/cm width).

Distance (m)	Oct. 2004	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	March 2005	April 2005	May 2005	June 2005	July 2005	August 2005	Sept. 2005	Efficiency distance %
10	-	18.0	10.3	19.3	28.7	18.7	19.0	20.1	45.7	43.3	11.0	-	143.8
20	-	18.0	9.0	17.3	27.3	17.7	19.0	20.0	50.3	46.0	9.7	-	143.7
30	-	25.0	14.7	20.6	35.7	23.0	22.0	23.0	60.3	55.3	19.6	-	128.1
40	-	24.6	16.7	24.0	37.6	22.3	25.0	26.0	62.6	61.0	21.7	-	122.7
L.S.D 0.05	-	2.2	1.4	1.4	2.4	1.1	2.4	2.4	8.3	6.4	1.9	-	

Table (9): Effect of interaction between fences and distance on the sand accumulation (gm/cm width).

Fences	Distance (m)	Oct. 2004	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	March 2005	April 2005	May 2005	June 2005	July 2005	August 2005	Sept. 2005	Interaction efficiency%
Without	10	-	20.0	14.0	20.0	40.0	22.0	18.0	18.0	65.0	55.0	8.0	-	132.7
	20	-	22.0	14.0	20.0	40.0	23.0	22.0	23.0	70.0	57.0	10.0	-	127.7
	30	-	26.0	18.0	21.0	46.0	29.0	26.0	27.0	66.0	56.0	21.0	-	119.2
	40	-	26.0	22.0	31.0	41.0	29.0	33.0	34.0	61.0	61.0	26.0	-	112.5
1Fence	10	-	16.0	3.0	14.0	19.0	13.0	19.0	20.0	36.0	36.0	9.0	-	155.6
	20	-	16.0	3.0	14.0	20.0	14.0	19.0	20.0	46.0	46.0	9.0	-	150.3
	30	-	23.0	14.0	16.0	29.0	18.0	20.0	21.0	56.0	56.0	19.0	-	134.6
	40	-	23.0	16.0	23.0	38.0	19.0	21.0	22.0	66.0	66.0	19.0	-	124.8
II fences	10	-	8.0	4.0	14.0	17.0	11.0	11.0	13.0	26.0	29.0	6.0	-	166.6
	20	-	12.0	6.0	14.0	18.0	12.0	12.0	12.0	31.0	31.0	6.0	-	163.0
	30	-	23.0	9.0	15.0	29.0	19.0	17.0	19.0	56.0	51.0	16.0	-	139.0
	40	-	22.0	9.0	15.0	31.0	16.0	18.0	18.0	58.0	53.0	17.0	-	138.3
L.S.D 0.05		-	11.5	11.1	11.4	11.5	11.1	11.2	12.2	11.8	11.4	9.1	-	

sand accumulation efficiency being to 66.6 and 63.0, respectively. Whereas, the distance of 40m without fence application gave the lowest value of sand accumulation efficiency. Generally, the combination of double fences and 10 m distance gave the lowest value. Whereas, the combination of the control and different distances obtained the highest values in most months.

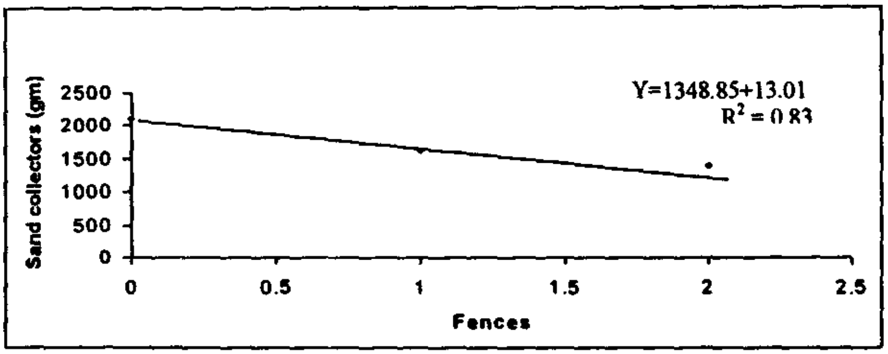

Fig. (3): Regression coefficient between fences and sand accumulation.

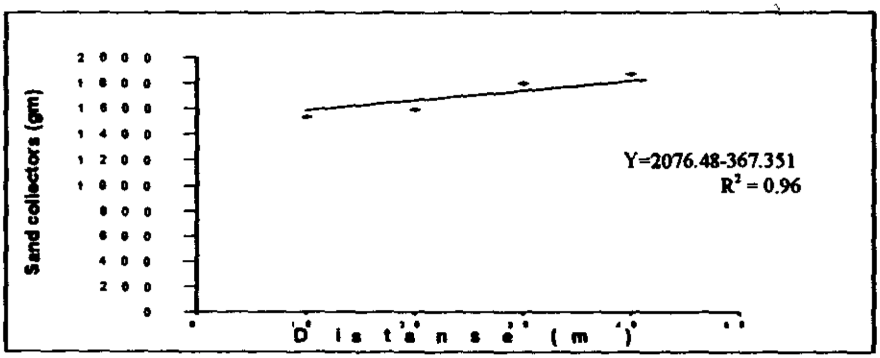

Fig. (4): Regression coefficient between distance and sand accumulation.

Conclusion and recommendation:

With regard to these results, it could be concluded that fences and distance play an important role in the increase of growth characteristics and yield of alfalfa plants.

The best applied treatment was double fence + 20m distance. This treatment increased the total yield, which could be use in a wide scale. This due to the minimize the wind velocity that resulted in decreasing the transpiration and evaporation of the vegetative growth .This is leading to keep water and carbohydrate to the highest value, which increase the yield.

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فعالية الأسوار في حماية البرسيم الحجازي المنزرع في الرواسب الرملية بسيوة

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أقيمت تجربه لدراسة فعالية الأسوار في حماية البرسيم الحجازي المنزرع في الرواسب الرملية بواحة سيوة في الصحراء الغربية بجمهورية مصر العربية خلال الفترة من ٢٠٠٤-٢٠٠٥ . و شملت التجربة عاملين. العامل الأول أسوار من جريد النخيل وتشمل (كنترول ، سور، سور مضاعف) العامل الثاني: المسافة بين الأسوار والمحصول كانت ١٠-٢٠-٣٠-٤٠ م ، كما وضعت مصائد الرمال أمام وخلف الأسوار و كانت أهم النتائج أن السور المضاعف + مسافة ١٠و٢٠م أعطت أعلى القيم في صفات النمو و كذلك محصول البرسيم الحجازي خلا ل الأربع حشات بالإضافة إلى أن نفس المعاملة أعطت أقل القيم في كميه الرمال المتجمعة بعد الأسوار خلال فترة الدراسة. لذلك توصي الدراسة بزراعة البرسيم الحجازي علي بعد عشرة أضعاف من ارتفاع السور المقام لحماية هذا المحصول في مناطق الرواسب الرملية.