Relation of Irrigation Intervals to Yield and Its Components of Some Egyptian Cotton Varieties

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ABSTRACT: This field study was carried out at Plant Production Department, Faculty of Agriculture (Saba Basha), Alexandria University, Egypt, during 2018 and 2019 seasons to determine the relation of irrigation intervals to yield and yield components of some Egyptian cotton cultivars. The yield trial was conducted at Sakha Agricultural Research Station, Agricultural Research Center, Egypt. Three interval irrigation treatments (A) were used every 14, 22 and 30 days. Three Egyptian cotton (B) i.e. Giza 86, Giza 92 and Giza 94 were chosen for this study. All the treatments were randomly distributed in strip design system in three replications.

Results showed that the highest mean values were recorded by A_1, (irrigation every 14 days) for boll weight, number of bolls per plant, seed cotton yield/plant, seed cotton yield/feddan, lint cotton yield/plant, lint cotton yield/feddan, lint cotton percentage and seed index in both seasons. On the other hand, the lowest mean values were given by A3, (irrigated every 30 days) for all studied traits. Likewise, the highest mean values were recorded by cotton variety (Giza 94) for all studied traits under the irrigation intervals compared with cotton varieties Giza 92 and Giza 86 at 2018 and 2019 seasons.

The results also cleared that the less effect of water stress condition was recorded by Giza 94 cotton variety and the highest effect for water stress on yield and yield component was given by Giza 92 cotton variety. From the aforementioned results, Giza 94 can be planted in the regions with limited water resources and be used as a parent to produce new that are more tolerant to drought stress.

Keywords: cotton – Gossypium spp. – irrigation intervals – cotton varieties – yield and yield components

INTRODUCTION

Cotton (Gossypium barbadense, L) is one of the most important fiber and oil crops of the world and plays a great role in world economy. Water is a especial and important factor which influences growth habit, yield and yield components of cotton crops. Crop is grown in tropical and subtropical regions around the world, such as North and South America, Africa, India, China (Zachary, 2007). The fiber is most often span into thread and used to make soft and quality textiles, which are the greatest widely used natural fiber cloth in clothing industry today. (Dumka *et al*. 2004). The largest seven countries in cotton production around the world are China, United States, India, Pakistan, Uzbekistan, Turkey and Brazil. On the other hand, the largest exporter countries are the United States, the Francophone zone of Africa, Uzbekistan, Australia and India (Srinivasan, 2006).

Egypt is a major agricultural Countries and prosperity of people greatly depends on the successful cultivation of different crops occupies central position because of its substantial foreign exchange through export of raw cotton, yarn and furnished product. Also, the cotton crop provides livelihood to millions of people who are engaged in textile industry directly or indirectly.

Successful cotton production depends on the availability of irrigation water. Irrigated agriculture in Egypt is facing great challenge because of water shortage and it needs water saving agriculture which take full advantage of available irrigation water. Also it needs new verities with high water use efficiency. In the recent years, Water use efficiency is a potential selection criteria for improving yield under water stress conditions (Hearn, 2000). The effective uses of irrigation water is a comprehensive exercise to use every possible saving measures in yield production on farm, including full use of natural precipitation as well as good efficient irrigation management information through a suitable planting method. Choosing the planting method is very important factor to affect cotton growth and development and finally gave the highest crop yield. Decrease in row spacing increased light interception, growth rate, total biomass production and increase water use efficiency, in addition better irrigation water use efficiency can be achieved through adopting the best crop management practices of irrigation (Staggenborag *et al.*, 1992,

Goyne and McIntyre, 2001). Efficient use of water to a crop is a very important consideration, where irrigation water resource is limited. it is crucial that growers have to make optimum use of every inch of available irrigation water (Ertek and Kanber, 2001; Varley *et al.,* 2000; Hoods, 2002 and Nadanassabdy and Kandasamy, 2002).To obtain the highest yield from a crop, you must have an efficient irrigation system. Water balance irrigation scheduling is the day to day accounting of the amounts of water coming into and growing out of the effective root zone of the crop. Also, this depends on measuring the land water content in the crop root zoon viewed as a system (Rajput, 2006 and Patel *et al.,* 1995).

This investigation was carried out to investigate the effect of irrigation intervals on yield and its components of Egyptian cotton varieties and how we get an economic yield with limited amount of water select one of the three cotton varieties that are tolerant to drought conditions to be grown in this region

MATERIALS AND METHODS

This investigation was carried out to evaluate the effect of irrigation intervals (number of irrigations on yield and yield components of three Egyptian cotton varieties during 2018 and 2019 season. The trial was conducted at Sakha Agricultural Research Station, Agricultural Research Center, Egypt. The design of the experiment was strip plot design with three replicates. The experimental plot size was 2.1 x 5 m (10.5 m2) (three rows in each plot). Planting dates were on 28th April and 8 May in 2018 and 2019 seasons, respectively. The planting was done with the help of single culture hand drill in lines. The irrigation intervals were considered as factor A, while Egyptian cotton varieties were assumed as factor B. The treatments details are as follows:

Factor A: (3 irrigation intervals)

A_1 = 8 irrigations: first one after 27 days from planting and subsequent irrigations at 14 days interval

A_2 = 6 irrigations: first one after 27 days from planting and subsequent irrigations at 22 days interval.

A_3 = 4 irrigations, first one after 27 days from planting and subsequent irrigations at 30 days interval.

Factor B : (3 Egyptian cotton varieties):

B_1 = Giza 86

B_2 = Giza 92

B_3 = Giza 94

The chemical fertilizers were applied as the recommended doses and the nitrogen fertilizer was applied in the form of urea (46%) (60 kg N/fed). The phosphorus fertilization was applied in the form of (18% P_2O_5, 22.5 kg/fed) and was applied to the soil at the time of planting. The first dose of nitrogen fertilization was added at the first irrigation and the complete dose of nitrogen fertilization was added before the next irrigation. Potassium fertilization was added as foliar fertilization in the form of Potasin F from Ministry of Agriculture and Land Reclamation. The row spacing was 70 cm apart and the distance between hills was 30 cm. All the recommended cultural practices were performed in all the subplots. Ten plants in each replicate for each treatment were chosen at random for all the calculated observations.

These plants were tagged and numbered separately. Data were recorded for the following parameters:

Studied traits:

1. Boll weight, B.W.(gm.)
2. Number of bolls/ plant.
3. Seed cotton yield/ plant, S.C.Y./P (gm.)
4. Seed cotton yield/ fedd., (S.C.Y./fedd. (kentar)
5. Lint cotton yield/plant (gm.)
6. Lint cotton yield/ fedd. (kentar)
7. Lint percentage (L %)
8. Seed index (gm.)

The data collected were subjected to statistical analysis using analysis of variance technique and Duncan multiple range values were used to test the differences between treatment means using MSTAT-C computer statistical software.

RESULTS AND DISCUSSION

The mean squares and mean performances of the three cotton varieties and three irrigation intervals and the interaction between them for yield and yield components are presented as follows:

Boll weight (B.W, gm.) and number of bolls per plant (No.B/P):

The mean square of boll weight and number of bolls/plant for each year 2018 and 2019 were calculated and the results are presented in Table (1). The results showed highly significant differences between irrigation intervals (Factor A) for the two studied traits in 2018 and 2019 seasons, respectively. Also, the results showed highly significant differences among Egyptian cotton varieties (Factor B) for boll weight and number of bolls/plant in 2018 and 2019 summer season. On the other hand, the results also showed that the interaction between irrigation intervals and cotton varieties was insignificant. These results are in agreement with those of Abd El-Malik and Radwan (1998), El-Shahawy and Abd El-Malik (2005), Sezener *et al.* (2015) and Yehia *et al* (2019).

Table (1): Mean squares of boll weight and number of bolls/plant for 2018 and 2019 seasons

S.O.V.	d.f.	Boll weight (gm)		Number of bolls/ plant	
		2018	2019	2018	2019
Rep.	2	0.009**	0.003	3.116	0.793
Factor A	2	0.990**	0.753**	21.59**	63.99**
Error A	4	0.100	0.007	1.465	0.458
Factor B	2	0.485**	0.679**	41.95**	43.01**
Error B	4	0.009	0.005	4.263	0.533
A * B	4	0.028	0.007	4.615	1.009
Error C	8	0.017	0.010	2.060	0.962

Factor A= irrigation intervals, Factor B= cotton varieties

The mean values of irrigation intervals, three Egyptian cotton varieties and their interactions for boll weight (B.W) and number of bolls/plant (No.B/P) in 2018 and 2019 are presented in Table (2). The results cleared those highly significant variances among the irrigation intervals for B.W and No.B/P in 2018 and 2019 seasons. Also, the results showed that irrigation treatment (A1) gave the highest mean values for boll weight 2.99 and 3.12 gm in 2018 and 2019 seasons, respectively.

The same trend was observed for number of bolls/plant with the mean values of 19.25 and 20.47 in the two seasons, respectively. On the other hand, the results reported that the lowest mean values were recorded by irrigation treatment A_3 with the mean values of 2.34, 2.55, 16.18 and 15.15 for boll weight and number of bolls/plant in 2018 and 2019 seasons, respectively. For the cotton varieties, the results showed highly significant differences among G.86, G.92 and G.94 cotton varieties under the irrigation intervals for boll weight and number of bolls/plant. The results showed that the highest mean values for boll weight were given by B3 (G.94) 2.87 and 3.08 gm in 2018 and 2019, respectively, while, the lowest mean values was given by G.92 (B2) 2.41 and 2.53 gm for 2018 and 2019 seasons, respectively. The results showed that, the interaction A_1 x B_1 in 2018 and A_1 x B_3 in 2019 gave the highest mean values (2.94 and 3.43) for boll weight, while the lowest mean values were recorded by the interaction A_3 x B_2 with the mean values 2.19 and 2.32 in 2018 and 2019, respectively, but for number of bolls/plant, the results showed that the highest mean values were recorded also by A_1 x B_1 and A_1 x B_3 in 2018 and 2019 seasons with the mean values 20.60 and 22.40, respectively. These results are in agreement with those recorded by Javaid *et al*. (2015), Sahito *et al*. (2015) and Yehia *et al*. (2020).

Table (2):The mean performances of irrigation intervals, cotton varieties and their interactions for boll weight and umber of bolls/plant for 2018 and 2019 seasons

S.O.V.	Boll weight (gm)		Number of bolls/plant	
	2018	2019	2018	2019
		Irrigation intervals (A)		
8 irrigations (A_1)	2.99 a	3.12 a	19.25 a	20.47 a
6 irrigations (A_2)	2.59 b	2.75 b	18.09 a	17.54 b
4 irrigations (A_3)	2.34 c	2.55 c	16.18 b	15.15 c
		Cotton varieties (B)		
Giza 86 (B_1)	2.60 b	2.82 b	18.42 a	17.81 b
Giza 92 (B_2)	2.41 c	2.53 c	15.45 b	15.49 c
Giza 94 (B_3)	2.87 a	3.08 a	19.60 a	19.85 a
		Interactions (A x B)		
A_1 * B_1	2.94 a	3.16 b	20.60 a	20.18 b
A_1 * B_2	2.68 c	2.79 d	17.53 abc	18.83 bc
A_1 * B_3	3.35 c	3.43 a	19.93 a	22.40 a
A_2 * B_1	2.56 cd	2.78 d	18.13 abc	17.90 c
A_2 * B_2	2.37 de	2.48 ef	16.24 c	15.33 d
A_2 * B_3	2.72 bc	3.00 bc	19.91 a	19.38 bc
A_3 * B_1	2.29 e	2.53 e	17.08 bc	15.36 d
A_3 * B_2	2.19 e	2.32 f	12.35 d	12.30 e
A_3 * B_3	2.55 cd	2.81 cd	19.11 ab	17.79 c

In the same column, under the same trait, means followed by the same letter are not significantly different according to Duncan's Multiple Range test, DMRT.

Seed cotton yield/plant (S.C.Y/P (gm) and seed cotton yield/fed (S.C.Y. /fed, (kentar):

The mean square of seed cotton yield per plant (S.C.Y. /P) and seed cotton yield kentar per fed. (S.C.Y. /fed.) were calculated and the results are presented in Table (3). The results showed highly significant differences among all irrigation intervals (Factor A) for the above two studied traits. Also, the results showed highly significant differences among Egyptian cotton varieties (Factor B) for seed cotton yield per plant and seed cotton yield kentar per feddan under the studied irrigation intervals. On the other hand, the results also reported that the interaction between irrigation intervals and cotton varieties were insignificant for the two studied traits. These results are in agreement with many authors, among them Memon *et al*. (2014), Sahito *et al.* (2015), Sezener *et al*. (2015), Yehia *et al.* (2019) and Yehia (2020).

Table (3): Mean squares of seed cotton yield per plant and seed cotton yield per feddan for 2018 and 2019 seasons

S.O.V.	d.f.	Seed cotton yield/plant (gm)		Seed cotton yield/fed (kentar)	
		2018	2019	2018	2019
Rep.	2	23.74	3.57	0.842	0.129
Factor A	2	872.01**	1456.13**	31.04**	51.93**
Error A	4	8.699	6.238	0.311	0.223
Factor B	2	794.47**	1082.5**	28.32**	38.65**
Error B	4	19.46	3.584	0.695	0.126
A * B	4	7.79	5.229	0.279	0.188
Error C	8	72.40	6.954	0.323	0.249

Factor A= irrigation intervals, Factor B= cotton varieties

The data for seed cotton yield per plant and seed cotton yield kentar/feddan (S.C.Y./P and S.C.Y./fed.) are presented at Table (4). The results for seed cotton yield/plant showed highly significant differences among factor A (irrigation intervals) and the highest mean values are presented by A_1 with the mean values 57.78 and 84.31 gm/plant at 2018 and 2019 seasons, respectively. While, the lowest mean values were given by A_3 with the mean values of 38.20 and 39.13 gm/plant of the two seasons, respectively. Also, the results show highly significant differences among studied cotton varieties (Factor B) and the results reported that the highest mean values were recorded by B3 56.044 and 61.63 gm/plant in 2018 and 2019 seasons, respectively, but, the lowest mean seed cotton yield/plant values were given by B2 37.69 and 39.69 gm/plant in the two summer seasons, respectively. These results are in agreement with many authors i.e. Abd El-Malik and Radwan (1998), El-Shahawy and Abd El-Malik (2005), Yehia et al. (2019) and Yehia (2020).

For the interaction between Factor A and Factor B for seed cotton yield /plant, the results recorded that the highest mean values recorded by the interaction A_1 x B_3 66.77 and 76.76 gm/plant in 2018 and 2019 seasons, respectively. While the lowest mean values of seed cotton yield per plant for the interaction between Factor A and Factor B were 26.99 and 28.51 for 2018 and 2019 seasons, respectively. These results are in agreement with Asadi *et al*. (2011), Ehattha *et al*. (2017); Yehia *et al*. (2019) and Yehia (2020).

For seed cotton yield kentar/fed (S.C.Y. /fed.), the results showed highly significant differences for factor (A) and the highest mean values were recorded by A_1 with mean values 10.91 and 12.15 kentar/fed. for 2018 and 2019 seasons, respectively, while the lowest mean values were given by A_3 with mean values 7.21 and 7.39 kentar/fed. in 2018 and 2019 seasons, respectively. On the other hand, for factor B, the results showed highly significant differences between all studied cotton varieties, and the highest mean values were recorded by B3 with mean values 10.66 and 11.64 kentar/fed. in 2018 and 2019 seasons, respectively.

For the interaction between factor A and factor B, the results showed that the highest mean values were given by A_1 x B3 12.61 and 14.50 kentar/fed. for the two seasons 2018 and 2019, respectively. But the lowest mean values were recorded by A_2 x B_2 with mean values 7.27 and 7.18 kentar/fed., at 2018 and 2019 seasons, respectively. These results are in agreement with El-Shahawy and Abd El-Malik (2005), Yehia *et al*. (2019) and Yehia (2020).

Table (4): The mean performances of irrigation intervals, cotton varieties and their interactions for seed cotton yield/plant and seed cotton yield/feddan for 2018 and 2019 seasons

S.O.V.	Seed cotton yield/plant (g)		Seed cotton yield/fed. (kentar)	
	2018	2019	2018	2019
	Irrigation intervals (A)			
8 irrigations (A_1)	57.78 a	46.31 a	10.91 a	12.15 a
6 irrigations (A_2)	46.27 b	48.61 b	8.74 b	9.18 b
4 irrigations (A_3)	38.20 c	39.13 c	7.21 c	7.39 c
	Cotton varieties (B)			
Giza 86 (B_1)	48.12 b	50.74 b	9.09 b	9.58 b
Giza 92 (B_2)	37.69 c	39.69 c	7.12 c	7.50 c
Giza 94 (B_3)	56.44 a	61.63 a	10.66 a	11.64 a
	Interactions (A x B)			
A_1 * B_1	58.99 b	65.66 b	11.14 b	12.02 d
A_1 * B_2	47.58 d	52.52 d	8.98 d	9.92 d
A_1 * B_3	66.21 a	76.76 a	12.61 a	14.50 a
A_2 * B_1	46.34 d	49.68 d	8.75 d	9.38 d
A_2 * B_2	38.49 e	38.05 e	7.27 e	7.18 e
A_2 * B_3	53.99 bc	58.10 c	10.19 bc	10.97 c
A_3 * B_1	39.09 e	38.87 e	7.37 e	7.34 e
A_3 * B_2	26.99 f	28.51 f	5.10 f	5.39 f
A_3 * B_3	48.56 cd	50.01 d	9.17 cd	9.15 d

In the same column, under the same trait, means followed by the same letter are not significantly different according to DMRT.

Lint cotton yield/plant, (gm) (L.C.Y. /P) and lint cotton yield/fed., (kentar) (L.C.Y./fed.)

The mean squares of lint cotton yield/plant and lint cotton yield/feddan in 2018 and 2019 seasons are presented at Table (5). The results showed highly significant differences among irrigation intervals (Factor A) for the above traits. Also, the same results were observed for Egyptian cotton varieties (Factor B), but for the interaction between irrigation intervals and cotton varieties, the results showed insignificant differences between them for lint cotton yield per plant (L.C.Y./p) and lint cotton yield per fed (L.C.Y./fed.) for 2018 and 2019 seasons.

These results are in agreement with Abd El-Malik and Radwan (1998), El-Shahawy and Abd El-Malik (2005); Yehia *et al*. (2019) and Yehia (2020).

Table (5): Mean squares of lint cotton yield/plant and lint cotton yield/feddan for 2018 and 2019 seasons

S.O.V.	d.f.	Lint cotton yield/plant (gm.)		Lint cotton yield/fed. (kentar)	
		2018	2019	2018	2019
Rep.	2	1.893	0.493	0.664	0.175
Factor A	2	166.19**	255.9**	58.16**	89.51**
Error A	4	1.746	0.733	0.163	0.255
Factor B	2	190.09**	245.9**	66.51**	86.05**
Error B	4	2.265	0.728	0.795	0.256
A * B	4	1.262	2.423	0.440	0.850
Error C	8	1.563	0.946	0.547	0.332

Factor A= irrigation intervals, Factor B= cotton varieties

The mean values of the irrigation intervals, three Egyptian cotton varieties and their interactions for lint cotton yield per plant and lint cotton yield per feddan are presented in Table (6). The results for Factor A (irrigation intervals) showed highly significant differences among all irrigation intervals and the highest mean values were given by A_1 treatment with mean values 21.83 and 24.44 gm/plant. But, the lowest mean values were recorded by A_3 with mean values 13.34 and 13.92 gm/plant for 2018 and 2019 seasons, respectively. Also, the results showed highly significant differences among all studied cotton varieties (Factor B) and the results also showed that the highest mean values were recorded by B_3, 21.83 and 23.95 gm/plant, but the lowest values were recorded by B_2, 12.63 and 13.50 gm/plant for 2018 and 2019 seasons, respectively. On the other hand, the results for the interaction between Factor A x Factor B recorded the highest mean values for lint cotton yield/plant A_1 x B_3 with mean values 26.71 and 30.84 gm/plant and the lowest mean values were recorded by A_3 x B_2 with mean values 8.69 and 9.35 gm/plant at 2018 and 2019 seasons, respectively. These results agreed with many authors, among them Memon *et al.* (2014), Jargand *et al.* (2015), Ehattha *et al*. (2017), Yehia *et al*. (2019) and Yehia (2020).

For lint cotton yield/feddan, the results presented in Table (6) showed highly significant differences among all irrigation intervals (Factor A) and the highest mean values were recorded by A1, 12.91 and 14.46 kentar/fed. While, the lowest values were given by A_3 with mean values 7.89 and 8.24 kentar/fed. for 2018 and 2019 seasons, respectively. Also, the results for factor B showed that the highest mean values were recorded by B_3 with mean values 12.91 and 14.17 kentar/fed., respectively. But the lowest mean for lint cotton yield (kentar/fed.) was recorded by B_2 with mean values 7.42 and 7.99 for 2018 and 2019 seasons, respectively. The results also illustrated that the highest mean values for the interaction between A x B were given by A_1 x B_3 with mean values 15.80 and 18.24 kentar/fed. While, the lowest mean interaction were recorded by A_3 x B_2 with mean values 5.14 and 5.53 kentar/fed. in 2018 and 2019 seasons, respectively. These results are in agreement with Abd El-Malik and Radwan (1998), El-Shahawy and Abd El-Malik (2005), Asadi *et al*. (2011), Yehia *et al*. (2019) and Yehia (2020).

Table (6): The mean performances of irrigation intervals, cotton varieties and their interactions for lint cotton yield/plant and lint cotton yield/feddan for 2018 and 2019 seasons

S.O.V.	Lint cotton yield/plant (gm.)		Lint cotton yield/fed. (kentar)	
	2018	2019	2018	2019
	Irrigation intervals (A)			
8 irrigations (A_1)	21.83 a	24.44 a	12.91 a	14.46 a
6 irrigations (A_2)	16.44 b	17.67 b	9.73 b	10.46 b
4 irrigations (A_3)	13.34 c	13.92 c	7.81 c	8.24 c
	Cotton varieties (B)			
Giza 86 (B_1)	17.16 b	18.58 b	10.15 b	10.99 b
Giza 92 (B_2)	12.63 c	13.50 c	7.47 c	7.99 c
Giza 94 (B_3)	21.82 a	23.95 a	12.91 a	14.77 a
	Interactions (A x B)			
A_1 * B_1	22.22 b	24.03 b	13.15 b	14.21 b
A_1 * B_2	16.56 c	18.46 c	9.79 c	10.92 c
A_1 * B_3	26.71 a	30.84 a	15.80 a	18.28 a
A_2 * B_1	15.98 c	18.00 c	9.45 c	10.65 c
A_2 * B_2	12.65 d	12.68 b	7.48 d	7.51 d
A_2 * B_3	20.71 b	22.32 b	12.25 b	13.21 b
A_3 * B_1	13.27 d	13.72 d	7.85 d	8.12 d
A_3 * B_2	8.69 e	9.35 e	5.14 e	5.53 e
A_3 * B_3	18.05 c	18.70 c	10.68 c	11.06 c

In the same column, under the same trait, means followed by the same letter are not significantly different according to DMRT.

Lint percentage (L%) and seed index (S.I):

Mean squares of lint percentage and seed index in 2018 and 2019 seasons, respectively were calculated and the results are presented in Table (7). The results showed highly significant differences among all the irrigation intervals (Factor A) for the two traits in 2018 and 2019 seasons. Also, the results showed highly significant differences among all the cotton studied varieties (Factor B) for all studied traits, while the interaction between Factor A and Factor B was insignificant for lint percentage and seed index at the two seasons 2018 and 2019, respectively. These results are in agreement with those of Abd El-Malik and Radwan (1998), El-Shahawy and Abd El-Malik (2005) and Yehia *et al*. (2019).

Table (7): Mean squares of lint percentage and seed index for 2018 and 2019 seasons

S.O.V.	d.f.	Lint cotton (%)		Seed index (gm.)	
		2018	2019	2018	2019
Rep.	2	1.351	0.059	0.079	0.010
Factor A	2	22.28**	14.97**	5.306**	3.131**
Error A	4	1.34	0.344	0.125	0.142
Factor B	2	62.85**	54.14**	5.910**	6.055**
Error B	4	0.937	0.761	0.186	0.044
A * B	4	0.546	0.066	0.077	0.027
Error C	8	0.791	0.520	0.520	0.035

Factor A= irrigation intervals, Factor B= cotton varieties

The mean performance of the irrigation intervals, three Egyptian cotton varieties and the interaction between them for lint percentage and seed index in 2018 and 2019 seasons, are presented at Table (8).

For lint percentage, the results showed highly significant differences among all studied irrigation intervals (Factor A) and the highest mean values were recorded by A_1 with mean values 37.48 and 37.69 for 2018 and 2019 seasons, respectively, while the lowest mean values were recorded by A_3 with mean values 34.46 and 35.16 at the two seasons, respectively. Also, for factor B, the cotton varieties, the results showed highly significant differences among all studied cotton varieties and the highest mean values were given by B_3 with mean values 38.53 and 38.66 for the two seasons 2018 and 2019, respectively, but the lowest mean values were recorded by B_2 with mean values 33.38 and 33.76 in 2018 and 2019 seasons, respectively. Also, the results for the interaction between factor A and factor B showed that the highest mean values are presented by A_1 x B_3 with mean values 40.0 and 40.16 for lint percentage for the two seasons 2018 and 2019, respectively. While, the lowest interaction was given by A_3 x B_2 with mean values 32.19 and 32.80 for the two seasons, 2018 and 2019, respectively. These results are in agreement with many authors i.e. Memon *et al.* (2014), Javoid *et al.* (2015), Ehattha *et al.* (2017), Yehia *et al.* (2019) and Yehia (2020).

For seed index, the results for Factor (A), irrigation intervals showed highly significant between intervals and the highest mean values were given by A1 with the mean values 8.97 and 9.01 at the two seasons, respectively. While, the lowest mean values were recorded by A_3 with the mean values 7.44 and 7.84 for 2018 and 2019 seasons, respectively. Also, the results for Factor B showed highly significant differences among all studied cotton varieties and the highest seed index (S.I) values were given by B_3 with mean values 8.87 and 9.10 g, but the lowest mean values recorded by B_2 with mean values 7.29 and 7.49 g at 2018 and 2019 seasons, respectively.

On the other hand, the results for the interaction between factors A x factor B recorded that the highest mean seed index values were given by the interaction A_1 x B_3 with mean values 9.60 and 9.69, for the two seasons 2018 and 2019, respectively. But the lowest mean values were given by the interaction A_3 x B_2 with mean seed index performance 6.58 and 6.90 for 2018 and 2019 seasons, respectively. These results are in agreement with those of Abd El-Malik and Radwan (1998), El-Shahawy and Abd El-Malik (2005), Sezener *et al.* (2015), Sahito *et al.* (2015), Yehia *et al.* (2019) and Yehia (2020).

Table (8): The mean performances of irrigation intervals, cotton varieties and their interactions for lint percentage and seed index for 2018 and 2019 seasons

S.O.V.	Lint cotton (%)		Seed index (gm)	
	2018	2019	2018	2019
		Irrigation intervals (A)		
8 irrigations (A_1)	37.48 a	37.69 a	8.97 a	9.01 a
6 irrigations (A_2)	35.24 b	36.01 b	8.13 b	8.31 b
4 irrigations (A_3)	34.46 b	35.16 c	7.44 c	7.84 b
		Cotton varieties (B)		
Giza 86 (B_1)	35.38 b	36.43 b	8.39 a	8.58 b
Giza 92 (B_2)	33.28 c	33.76 c	7.29 b	7.49 c
Giza 94 (B_3)	38.53 a	38.66 a	8.87 a	9.10 a
		Interactions (A x B)		
A_1 * B_1	37.87 b	37.77 b	9.07 b	9.14 b
A_1 * B_2	34.80 e	35.15 d	8.25 d	8.21 d
A_1 * B_3	40.00 a	40.16 a	9.60 a	9.69 a
A_2 * B_1	34.50 cd	36.23 cd	8.44 cd	8.60 c
A_2 * B_2	32.84 de	33.35 e	7.04 f	7.36 e
A_2 * B_3	38.37 ab	38.43 b	8.92 bc	8.98 b
A_3 * B_1	33.98 cd	35.289 d	7.75 e	7.99 d
A_3 * B_2	32.19 e	32.80 e	6.58 f	6.90 f
A_3 * B_3	37.21 b	37.39 bc	8.09 de	8.62 c

In the same column, under the same trait, means followed by the same letter are not significantly different according to DMRT.

From the above, it can be recommended to plant the cotton variety Giza 94 and irrigate every 14 days to obtain the highest yield of cotton per feddan in Kafr El-Sheikh governorate.

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الملخص العربي

علاقة فترات الري بالمحصول ومكوناته لبعض أصناف القطن المصري

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أجرى هذا البحث بقسم الإنتاج النباتى كلية الزراعة سابا باشا جامعة الأسكندرية وتم تنفيذ البحث بمحطة البحوث الزراعية بسخا لدراسة تأثير فترات الري وصنف القطن علي صفات المحصول ومكونات لبعض أصناف القطن المصرى. إستخدم في الدراسة ثلاثة أصناف من القطن المصري هي : جيزة 86، جيزة 92 وجيزة 94 . حيث استخدمت ثلاث معاملات ري وهي الري كل 14 و 22 و30 يوم (8، 6، 4 ريات على الترتيب). إقيمت التجربة في الموسمين الزراعيين 2018 و 2019 في تصميم القطاعات المنشقة.

وأشارت النتائج المتحصل عليها ان الرى كل 14 يوم (A_1) (8 ريات) سجل أعلى القيم لمتوسط وزن اللوزة/نبات،عدد اللوز/نبات، محصول القطن الزهر/ نبات، محصول القطن الزهر/فدان، محصول القطن الشعر/نبات، محصول القطن الشعر/فدان، النسبة المئوية للقطن الشعر ومعامل البذرة.

وبالنسبة للاصناف المستخدمة سجل صنف القطن المصرىجيزة 94 (B_3) أعلى القيم لمتوسطات الصفات سالفة الذكر على الترتيب بالمقارنة بباقى الأصناف المدروسة.

وسجل التداخل بين معاملة الرى كل 14 يوم (A_1) وصنف القطن جيزة 94 (B_3) أعلى القيم لمتوسط كل من عدد اللوز/نبات، محصول القطن الزهر/نبات، محصول القطن الزهر/فدان، محصول القطن الشعر/نبات، محصول القطن الشعر/فدان، النسبة المئوية للقطن الشعر ومعامل البذرة.

ومماسبق يمكن التوصية بزراعة صنف القطن جيزة 94 والرى كل 14 يوم للحصول على أعلى محصول من القطن للفدان فى محافظة كفر الشيخ.