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PRODUCTIVITY OF GIZA 90 COTTON CULTIVAR UNDER DIFFERENT IRRIGATION SCHEDULES AND NITROGEN FERTILIZATION LEVELS.

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ABSTRACT

Two field experiments were carried out at the Agricultural Experiment and Research Station, Faculty of Agriculture, Cairo University during 2002 and 2003 seasons to study the response of Giza 90 Cotton cultivar to different irrigation schedules (15 , 25 , 25/15 and 15/25 days) and nitrogen levels 15 , 30 and 45 Kg N / fed) 30 Kg P_2O_5/F and 48 Kg K_2O/F levels were applied as recommended at planting. Nitrogen was applied before the second and third irrigations. The experimental design was a split plot design with four replicates, where , irrigation treatments were allocated in main plots and nitrogen levels were allocated in subplot.

Irrigation treatment significantly affected plant height, position of first sympodial node, number of sympodial branches , number of open bolls/plant, boll weight , seed cotton yield/ plant and / feddan , lint percentage and earliness percentage and some fiber properties. Scheduling irrigation in shorter intervals (15 days) during the vegetative stage followed by longer intervals (25 days) i.e. in 15/25 combination recorded the highest seed cotton yield/fed in both seasons (2899.57 and 2937.25 Kg / fed respectively).

Nitrogen level significantly affected plant height (first season) position of first sympodial node , boll weight (second season), seed cotton yield / plant and / feddan , lint percentage and earliness percentage The use of 45 Kg N +/fed gave the highest seed cotton yield in both seasons (1434.82 and 1382.85 Kg / fed respectively).

The irrigation interval X N level interaction had significant effects on seed cotton yield/fed and all of its components. The highest yield was recorded due to scheduling interaction in shorter interval (15 days) during the vegetative stage followed by longer ones (25 days) during the fruiting stage with the use of the medium level (30 kg N/fed).

The consumptive use was decreased . The suggested irrigation interval pattern (15/25) saved 560.35 , 659.95 and m^3/fed compared with the 15 days pattern in the two seasons, respectively.

INTRODUCTION

Irrigation is one of the main factors that effects crop production . Irrigation intervals determine the duration of water availability. Brown and Ware (1958) reported that late irrigation delays boll opening which may cause more infestation by boll weevil, pink boll worm or boll rat. Zein El-Abedine et al(1962) found that in top 50 cm soil layer, moisture did not fall below the wilting point between irrigations , whereas in top 30 cm layer, moisture does not reach wilting point with the shorter irrigation intervals , but with longer intervals, wilting point may be reached. Nour El- Din *et al* (1970) reported that, narrowing irrigation interval increased seed cotton yield. Sawires (1976) reported a linear increase in boll weight and seed cotton yield by decreasing water intervals .Zahran *et al* (1979) mentioned that shortening irrigation

interval increased seed cotton yield decreased earliness. Abe El- Rahman *et al* (1980) found that reducing irrigation intervals, increased number of open bolls/ plant and seed cotton yield/fed. Gomaa *et al* (1981) and Shalaby *et al* (1981) concluded that, when irrigation interval was decreased significant increases were found in bolls number/plant , boll weight, number of fruiting branches/ plant and seed cotton yield / feddan, while earliness percentage was significantly decreased. However, Mohamad *et al* (1984) reported that, boll weight, number of open bolls/ plant , seed cotton yield / plant and feddan were not affected by irrigation intervals, while earliness was significantly increased by increasing irrigation interval. El- Shahawy and Makram (1995) found that , delaying irrigation increased plant height, number of fruiting branches, number of open bolls, boll weight, seed cotton yield/plant and feddan, lint percentage and seed index.

Nitrogen also is an important factor in crop production Gomaa *et al* (1981), Sawan (1986) , Ghaly *et al* (1988) and Abd El- Aal (1990) mentioned that, increasing nitrogen level increased boll weight number of open bolls/ plant, seed cotton yield / plant and feddan and number of sympodial branches of plant. Ebad *et al* (1988) and El- Shaer *et al* (1988) found that used 45 Kg N/ fed. increased number of bolls/ plant, seed cotton yield / fed., earliness percentage, lint percentage and fiber strength. Elayan (1992) and Soad *et al* (1992) reported that using 90 Kg N/ fed. increased significantly the number of open bolls/ plant, boll weight and seed cotton yield/plant and feddan. While, Abou Zeid and Mohamed (1985) reported that increasing nitrogen level from Zero up to 60 kg N/ fed. Was without of significant effect on number of open bolls / plant . El- Shinnawy *et al* (1983) and El- Dababy and Hammam (1987) reported that nitrogen level had significant effect on number of open bolls / plant and seed cotton yield / plant and fed. Eweida *et al* (1979 a) found that nitrogen rates had no significantly effect on number of fruiting branches / plant . Makrm *et al* (1982) and reported that, fiber length, fiber strength and micronaire reading were not significant affected by nitrogen level. Rizk (1974) shaved that, increasing nitrogen level significantly increasing fiber length. Abd El- Gawad *et al* (1985) found that fiber length at 2.5% S.L. and fiber uniformity ratio were increased by applying 60 Kg N/ fed. Sawan (1986) reported that increasing N rates siginificantly increased seed cotton yield, number of fruiting branches, boll weight, number of open bolls/plant , lint percentage and seed index.

Elayan (1992) indicated that, increasing nitrogen levels up to 60 Kg per feddan led to a significant increase of boll weight, number of open bolls/plant,seed cotton yield/plant and /feddan. El-Gahel *et al* (1995) showed that, number of open bolls, boll weight and seed cotton yield were increased as N rates were increased in contrast to earliness.

MATERIALS AND METHODS

Two field experiments were carried out at the Agricultural Experiment and Research Station, Faculty of Agriculture, Cairo University, Giza during 2002 and 2003 seasons to study the effect of irrigation scheduling through the vegetative and fruiting stages and nitrogen level (15,30 and 45kg N /fed.)

and their interactions on the growth, yield, yield components and some fiber properties on Giza 90 cotton variety. The experimental design was a split plot with four replicates. Sub plot size was 3 × 3.5 m^2 with five rows. 60 cm apart and 3.5 m long. The main plots were devoted to scheduling irrigation treatments which were as follows:

1-Irrigation every 15 days.
2-Irrigation every 25 days.
3-Irrigation every 15 days up to the first flower and every 25 days thereafter.
4-Irrigation every 25 days up to the first flower and every 15 days thereafter.

The sub-plots were devoted for three nitrogen levels (15 , 30 and 45 kg N/fed.) nitrogen was added as ammonium nitrate (33.5% N) as side dressing before the 2nd and 3rd irrigations The seeds were planted on the fourth week of March in both seasons. The other cultural practices were carried out as recommended for the conventional cotton planting phosphorus and potassium where applied at to planting . The preceding crop was berseem in both seasons. Ten guarded plants were taken at random from each plot to determine growth attributes and yield components. Seed cotton yield/feddan was calculated from the three central rows of each sub plot.

Recorded data:-

A- Growth attributes:

A-1- Plant height (cm): Measured from soil surface to the top of the plant.

A-2- Position of first sympodial node: Recorded as number of nodes to the first fruiting branch .

A-3- Number of sympodial branches/plant.

B- Yield and yield components:

B-1- Number of open bolls/plant: As the average number of bolls of ten plants.

B-2- Boll weight (gm): The average weight of 50 bolls picked at random from each plot:

B-3- Seed cotton yield/plant (gm).

B-4- Seed cotton yield/feddan : determined from the three central rows of each plot in kentar/feddan (kentar= 157.5 kg).

B-5- Lint percentage; sample lint weight relative to seed cotton weight as a percentage.

B-6- Seed index (gm): as the weight of 100 seeds.

B-7- Earliness percentage: Determined as percentage of seed cotton yield at the first pick to the total seed cotton yield /plot.

C- Fiber properties :

The following fiber properties were measured using HIGH VOLUME INSTRVMENT (HVI). High volume fiber test system according to (A.S.T.M : D – 46050 – 1986) .

C-1- Fiber length parameters

C-1-a- Fiber length at 2.5% span length

C-1-b- Fiber length at 50% span length.

C-1-C- Fiber uniformity ratio (U.R)

C-2- Fiber bundld tensile:

C-2- a- Fiber strength: Measure by HVI in gram /tex units.

C-2-b- Fiber elongation %: The parcentage of elongation, which accurse before as fiber bundle breaks.

C-3- Fiber fineness:

Micronaire reading: Fineness was expressed as micronaire instruments reading. measured by (HVI).

All tests were performed at the laboratories of Cotton Research Institute, Agricultural Research Center, under constant conditions of temperature (70 ±° F) and (65% ± 2) of relative humidity.

Soil sampling was carried out before and after ech irrigation in duplicate samples where taken at 60cm depth. Soil samples were immediately weighed then dried in an electric oven at 105°C for 24 hours.

Moisture content%

$$= \frac{\text{soil sample wet weight} - \text{soil sample dry weight}}{\text{soil sample dry weight}} \times 100$$

Water consumptive use was calculated according to Israelson and Hansen (1962).

$$CU = \frac{\sigma^2 - \sigma^1}{100} \times Bd \times S.D \times \text{filed area}$$

where:

σ_1 = Soil moisture percent befor irrigation

σ_1 = Soil moisture percent after irrigation

Bd = Bulk density in gr/cm^2

S.D. = Soil depth (60 cm)

Field area = Feddan ($4200\ m^2$)

$$\text{Water use efficiency} = \frac{\text{Seed cotton yield kg/fed}}{\text{Water consumptive use } m^3/\text{fed}}$$

Mean values were compared at 0.05 level according to Snedecor and Cochran (1981). Soil analysis was performed according to Jackson (1973). Results of soil mechanical analyses are presented in Table (1) .

Table (1): Soil mechanical and chemical analyses of the upper 50 cm soil depth in 2002 and 2003 seasons.

property	2002	2003	property	2002	2003
pH	8.3	8.3	Available N ppm	22.0	25.0
Ec mmohs/cm 25C	6.9	6.1	Available P ppm	10.1	9.9
Organic matter %	1.75	1.85	Available K ppm	250.0	240.0
Soil texture	Clay Loam	Clay loam			

RESULTS AND DISCUSSION

A- Growth attributes:

A-1- plant height:

Data in Tables (2) and (3) showed that , irrigation , nitrogen fertilization and the interaction between them had significant effects on plant height. Scheduling irrigation at 15 days interval throughout the whole season

produced the tallest plant in the first season. Cotton plant became shorter due to prolonging the irrigation interval particularly during the vegetative stage. Shortening the irrigation interval during the fruiting stage did not help cotton plants to catch the height of those irrigated regularly at 15 days interval. This effect was also observed in the second season, but with lower magnitude.

Regarding N levels effect, addition of the first N increment in the first season caused a significant increase the plant height, but the further increase in N level did not add a significant increase in this respect. Differences were insignificant in the second season. These results clearly indicate that shorter irrigation intervals particularly during the early growth stages enhanced plant elongation particularly in the first season. Also, addition of 30 kg N/fed were quite enough to increase plant height in the first season. Similar results obtained by Ragab (1985), Radin *et al* (1992) and Wanjura *et al* (1996) . El-Gahel *et al* (1995) and El-Shahawy and and Abd El- Malik (1999) found that, higher N level cotton plants were more efficient to get higher final plant height with more main stem node production.

Regarding the irrigation X N level interaction, a trend of greater response to the increase of N level could be observed when irrigation was scheduled at 15 days interval during the whole season than when it was scheduled at 25 days interval. Surprisingly, a significant decrease was detected in the second season in plant height due the increase of N level to 45 kg N/fed, when irrigation was scheduled as in the 25/15 days pattern . This decrease could be served to explain the insignificancy of differences in plant height due to varying the N level. These results clearly indicate that high N fertilized plants made more elongation when, they received irrigation at shorter than at longer intervals.

A-2- Position of first sympodial node:

Data in Table (2) and (3) indicated that , all treatments under study and the interaction between them significantly affected on position of first sympodial node, where, irrigated plants at 15/25 days interval pattern was superior in position of first sympodial node in both seasons. The use of 30 kg N /fed gave the best mean value in both seasons. Irrigated plants at 15/25 days interval pattern with the use of 30 Kg N /fed gave the lowest sympodial node in the first seasons. The same in level with irrigation at 25/15 days interval pattern gave the lowest sympodial node in second season. El-Shahawy and Abd El-Malik (1999) found that, narrow irrigations delayed maturation in terms of raising position of the first sympodium

A-3- Number of sympodial branches/plant:

Data in Tables (2) and (3) indicated that, irrigation and the interaction between irrigation and nitrogen levels significantly affected number of sympodial branches/ plant, where irrigation at 15/25 days was superior in this trait in both seasons (11.66 and 11.78 respectively). Nitrogen fertilizer level did not show any significant effect in this respect in both seasons. Irrigation at 25/15 days interval pattern with the use of 15Kg N/fed gave the highest mean value of number of sympodial branches/ plant in the first season but in the second season same treatment of irrigation with the use of 30 Kg N/fed gave the best mean value . Mohamad *et al* (1984) and El- Shahawy and Abd

El-Malik (1999) found that, prolonging irrigation interval caused significant increase in number of sympodial per plant but nitrogen level had no significant effect on number of sympodial branches/plant. Similar results were obtained by Eweida *et al* (1979 a) but contradict those reported by Gomaa *et al* (1981) and El- Gahel *et al* (1995).

Table (2): Main effects of irrigation and fertilization on some growth attributes of Giza 90 cotton variety in the two seasons.

Main effects	Plant height (cm)		Position of first sympodial node		Number of sympodial branches/plant	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
A- Irrigation treatments:						
1- Every 15 days	124.01	119.42	5.79	6.26	10.98	10.91
2- Every 25 days	118.58	115.29	5.71	5.90	11.62	1023
3- Every 25/15 days	112.94	112.28	6.12	5.88	11.11	11.57
4- - Every 15/25 days	120.73	118.97	5.30	5.77	11.66	11.78
L.S.D. 5%	**2.15**	**5.12**	**0.51**	**0.28**	**0.86**	**0.84**
B-Nitrogen levels:						
1-15 Kg N/fed	116.99	116.86	5.76	5.93	10.96	10.79
2- 30 Kg N/fed	119.84	116.35	5.55	5.60	11.15	11.26
3- 45 Kg N/fed	120.35	116.35	5.88	6.31	11.17	11.32
L.S.D. 5 %	**2.21**	**NS**	**0.21**	**0.43**	**NS**	**NS**

Table (3): The effect of first order interaction of irrigation and fertilization on some growth attributes of Giza 90 cotton variety in the two seasons.

Treatments	Plant height (cm)			Position of first sympodial node			Number of sympodial branches/plant		
	Nitrogen levels			Nitrogen levels			Nitrogen levels		
	15 KgN/ fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 KgN /fed	45 Kg N/fed	15 Kg N /fed	30 Kg N/fed	45 Kg N/fed
A- Irrigation treatments:	**1st season**								
1- Every 15 days	120.80	127.50	133.68	6.15	5.65	5.58	10.43	11.06	11.26
2- Every 25 days	115.50	116.95	123.31	5.63	4.46	5.83	10.55	10.56	10.76
3- Every 25/15 days	112.94	118.18	110.33	5.75	6.21	6.41	11.86	11.10	11.20
4- - Every 15/25 days	120.73	116.78	124.06	5.33	4.86	5.71	11.80	11.70	11.48
L.S.D. 5%	**11.26**			**1.18**			**1.33**		
A- Irrigation treatments:	**2nd season**								
1- Every 15 days	118.40	117.13	122.75	6.65	6.15	6.00	10.38	11.43	10.93
2- Every 25 days	120.93	115.56	109.68	5.51	5.51	6.61	9.70	9.86	11.13
3- Every 25/15 days	109.58	115.58	111.70	5.91	2.26	6.48	11.61	12.10	11.00
4- - Every 15/25 days	118.50	117.11	121.26	5.73	5.48	6.10	11.46	11.65	12.25
L.S.D. 5 %	**9.10**			**1.07**			**1.82**		

B- Yield and yield components:

B- 1- Number of open bolls / plant:

Data in Tables (4) and (5) indicated that , irrigation treatments had a significant effect in the first season only, where irrigation at 15/25 days interval pattern gave the highest number of open bolls / plant . Nitrogen level

did not show a significant effect on number of open bolls / plant in both seasons. The interaction between irrigation and fertilizer levels significantly affected number of open bolls / plant . Irrigation at 15 / 25 days interval pattern with the use of 30 Kg N/fed was superior in this trait in both seasons. These results clearly indicate that narrow irrigation interval during the vegetative stage afforded cotton plants better growth than those receiving irrigation at wider irrigation interval. However, during the fruiting stages plants could have had more photosynthates to cover the needs of a higher number of open bolls when they received irrigation at 25 days interval. These results are in agreement with those obtained by Sawan (1986) and El-Shahawy and Abd El- Malik (1999) and disagreement with those of Mohamad *et al* (1984), Elayan (1992) and Abd El- Hafeez *et al* (2000).

B-2- Boll weight:

Data in Tables(4) and (5) showed that irrigation , in levels in the second season and the interaction between them had significant effects on boll weight. Prolonging irrigation interval decreasing boll weight. This result is agreement with those obtained by Abd El- Malak and Radawn (1998) and Abd El-Hafeez *et al* (2000) and in disagreement with those of Mohamed *et al* (1984). Increasing nitrogen level/fed increased boll weight . This result is in the same line of Elayan (1992) El-Gahel *et al* (1995) and Abd – El-Hafeez *et al* (2000) and disagreement with those obtained by Mohamad *et al* (1984) and Abd El- Aal *et al* (1990). Irrigation every 15/25 days with the use of 30 Kg N /fed in the first season and with the use of 45 kg/N /fed, in the second season recorded the heaviest boll weight interval decreasing seed cotton yield/ plant in both seasons. This result is in agreement with those obtained by Ali (1990) and Abd El- Hafeez *et al* (2000), where , irrigation every 14 days made a good balance between vegetative and fruiting growth and hence promoted absorption and use of nutrients. Increasing nitrogen level up to 45 Kg N/fed increased this trait . This result agrees with those of Mohamad *et al* (1984), Elayan (1992) and Abd El- Hafeez *et al* (2000). Irrigation 15/25 days interval pattern with the use of 30 Kg N/fed recorded the highest seed cotton yield / plant in both seasons.

B-4- Seed cotton yield / feddan:

Data in Tables (4) and (5) indicated that, irrigation treatments, nitrogen levels and the interaction between them had significant effects on seed cotton yield/feddan in both seasons. Narrowing the irrigation treatment increased seed cotton yield/ feddan . This result is a agreement with those obtained by Ali (1990) and Abd El-Hafeez *et al* (2000). Increasing amount of N up to 45 Kg N/ feddan increased seed cotton yield/ feddan in both seasons. This result is agreement with El- Shinnawy *et al* (1983) and Elayan (1992). Irrigation interval 15/25 with the use of 30 Kg N/fed was superiour in seed cotton yield /feddan in both seasons.These results clearly indicate that cotton plants were in need for shorter irrigation interval during the vegetative stage, but, longer interval during the fruiting stage. This irrigation schedule pattern along with the medium N level under study (30kg N/fed) maintained a good balance between the vegetative and fruiting growth where a larger number of bolls/plant with heavier boll weight were obtained. These two yield components could account for the increase of seed cotton yield/fed observed herein.

Table (4): Main effects of irrigation and fertilization on yield and some yield components of Giza 90 cotton variety in the two seasons.

Main effects	Number of open bolls/ plant		Boll weight (gm)		Seed cotton yield /plant (gm)		Seed cotton yield / Feddan (Kent)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
A- Irrigation treatments :								
1- Every 15 days	12.16	13.23	2.22	2.20	26.99	29.11	7.71	8.32
2- Every 25 days	11.85	13.41	2.33	2.22	27.61	29.77	7.89	8.51
3- Every 25/15 days	12.88	13.89	2.53	2.34	32.59	30.96	9.31	8.85
4- - Every 15/25 days	13.13	13.23	2.54	2.37	33.35	32.92	9.53	9.41
L.S.D. 5%	1.26	NS	0.12	0.11	2.22	0.92	0.94	0.51
B-Nitrogen levels:								
1-15 Kg N/fed	12.23	13.27	2.38	2.22	29.11	29.46	8.22	8.42
2- 30 Kg N/fed	12.74	13.50	2.39	2.27	30.45	30.65	8.70	8.76
3- 45 Kg N/fed	12.54	13.56	2.45	2.35	30.72	31.87	8.78	9.11
L.S.D. 5 %	NS	NS	NS	0.09	0.85	0.75	0.33	0.41

Table (5): The effect of first order interaction of irrigation and fertilization on yield and some yield components of Giza 90 cotton variety in the two seasons.

Treatments	Number of open bolls/ plant			Boll weight (gm)			Seed cotton yield /plant (gm)			Seed cotton yield /feddan (ken)		
	Nitrogen levels			Nitrogen levels			Nitrogen levels			Nitrogen levels		
	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed
A- Irrigation treatments :	1st season											
1- Every 15 days	11.85	12.61	12.03	2.21	2.30	2.16	26.19	29.00	25.98	7.48	8.29	7.42
2- Every 25 days	11.60	11.33	12.61	2.28	2.35	2.38	26.45	26.63	30.01	7.55	7.61	8.57
3- Every 25/15 days	13.01	13.41	12.23	2.58	2.46	2.55	33.57	32.99	31.19	9.59	9.43	8.92
4- - Every 15/25 days	12.48	13.61	13.30	2.50	2.68	2.45	31.20	36.48	32.59	9.92	10.42	9.50
L.S.D. 5%	1.75			0.15			4.25			1.64		
A- Irrigation treatments :	2nd season											
1- Every 15 days	12.98	12.55	14.16	2.20	2.21	2.18	28.56	27.74	30.87	8.16	7.93	8.82
2- Every 25 days	12.93	13.48	13.83	2.18	2.13	2.35	28.19	78.71	32.50	8.05	8.20	9.29
3- Every 25/15 days	13.08	13.75	12.86	2.26	2.33	2.43	29.56	32.04	31.25	8.45	9.15	8.93
4- - Every 15/25 days	14.08	14.21	13.38	2.25	4.41	2.46	31.68	34.25	32.91	9.05	9.79	9.40
L.S.D. 5%	0.92			0.12			3.09			1.09		

These results are quite interesting an they indicate that cotton plants with their and larger foliage at the time of flowering were not in need for narrowing the irrigation interval or before flowering. The large foliage cover might have had played a role in decreasing evaporation, though it could have increased respiration. The present results clearly indicate that evapotranspiration requirements could be met through longer irrigation interval (25 days) during the fruiting stage and shorter interval (15 days) during the vegetative stage. Cotton plants made beggar growth and hence produced higher seed cotton yield/fed with the addition of kg N/fed.

B-5- Lint percentage :

Data in Tables (6) and (7) indicated that, irrigation, nitrogen levels (in the first season) and the interaction between them had significant effects on lint percentage in both seasons . Decreasing the irrigation interval increased lint percentage. This result is in agreement with that obtained by El-Shahawy and Makram (1995). Increasing nitrogen level increased lint percentage. This result is in agreement with Sawan (1986) , El- Shaer *et al* (1988) and El-Gahel *et al* (1995). Irrigating at 15 / 25 days interval pattern with the use of 45 Kg N / feddan gave the highest lint percentage in the first season but, in the second season irrigation at 25/15 days interval pattern with the use of 30 Kg /N/feddan gave the best lint percentage .

B-6- Seed index :

Data in Tables (6) and (7) showed that, irrigation and nitrogen levels did not show any significant effects on seed index in both seasons. However, the interaction between irrigation x N level had a significant effect on seed index . Irrigation intervals of 15/25 days pattern with the use of 45 Kg N/ feddan gave the best reading in the first season, while, in the second season the same irrigation interval with the use of 15 kg N/feddan was superior in seed index . Decreasing irrigation interval with increasing nitrogen level increased seed index but the increasing nitrogen level increased seed index but the increase did not reach the level of significance. These results are agreement with that obtained by Sawan (1986), El- Gahel *et al* (1995) and El-shahawy and Makram (1995).

Table (6): Main effects of irrigation and fertilization on some yield components of Giza 90 cotton variety in the two seasons.

Main effects	Lint percentage		Seed index (gm)		Earliness percentage	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
A- Irrigation treatments:						
1- Every 15 days	36.76	37.71	9.80	9.66	57.85	61.47
2- Every 25 days	37.16	37.97	9.93	9.66	59.96	62.13
3- Every 25/15 days	37.32	38.17	10.08	9.83	60.26	61.30
4- - Every 15/25 days	37.48	38.21	10.55	10.12	62.42	62.14
L.S.D. 5%	**0.43**	**0.41**	**NS**	**NS**	**2.52**	**0.84**
B- Nitrogen levels:						
1-15 Kg N/fed	36.84	37.63	9.97	9.78	59.62	60.79
2- 30 Kg N/fed	37.07	38.15	10.10	9.80	60.35	62.12
3- 45 Kg N/fed	37.62	38.26	10.20	9.87	60.41	62.37
L.S.D. 5 %	**0.63**	**0.23**	**NS**	**NS**	**1.41**	**1.10**

Table (7): The effect of first order interaction of irrigation and fertilization on some yield components of Giza 90 cotton variety in the two seasons.

Treatments	Lint percentage			Seed index (gm)			Earliness percentage		
	Nitrogen levels			Nitrogen levels			Nitrogen levels		
	15Kg Nfed	30Kg Nfed	45Kg Nfed	15Kg Nfed	30Kg Nfed	45Kg Nfed	15Kg Nfed	30Kg Nfed	45Kg Nfed
A- Irrigation treatments:	1st season								
1- Every 15 days	36.16	36.48	37.65	9.30	10.08	10.01	56.86	61.96	54.71
2- Every 25 days	36.93	36.86	37.68	10.18	9.73	9.88	55.50	62.25	62.15
3- Every 25/15 days	37.70	37.58	37.38	10.11	10.18	9.96	60.55	61.03	59.20
4- - Every 15/25 days	37.28	37.38	37.78	10.28	10.43	10.93	65.56	56.16	65.58
L.S.D. 5%	1.13			0.89			6.35		
A- Irrigation treatments:									
1- Every 15 days	37.25	37.65	38.25	9.73	9.50	9.75	63.45	62.56	58.40
2- Every 25 days	37.63	38.00	38.28	9.51	9.75	9.70	60.60	58.66	64.63
3- Every 25/15 days	37.58	38.55	38.40	9.51	10.03	9.95	61.08	63.96	61.36
4- - Every 15/25 days	38.08	38.41	38.13	10.31	9.45	10.11	58.05	63.28	65.10
L.S.D. 5 %	0.95			0.42			5.90		

B-7- Earliness percentage :

Data in Tables (6) and (7) showed significant differences in earliness percentage between treatments under study and their interaction in both seasons. Irrigation every 15/25days increased significantly earliness percentage. This result is in agreement with that obtained by Goma *et al* (1981) and Mohamad *et al* (1984) and Shalaby *et al* (1981) mentioned that narrowing irrigation interval decreased earliness percentage.The use of 45 Kg N/feddan gave the best mean value in earliness percentage in both seasons. Irrigation at interval 15/25 days with the use of 45 Kg N/feddan gave the best mean value in earliness percentage in both seasons. These results clearly indicate that irrigation as in the 15/25 interval pattern with the use of 45 kg N/fed recorded the highest earliness percentage. However, the results of seed cotton yield/fed indicated that the highest seed cotton yield/fed was recorded due to the same irrigation interval pattern but, with the use of only 30kg N/fed. These results refer to differences in fruiting architecture between the medium and high N fertilized plants where the formers had larger number of early open bolls than the latter .

C- Fiber properties :

Data in Tables (8) and (9) reaveled that all treatments under study and the interaction significantly affected fiber length at 2.5% and 50% span length, fiber strength and fiber elongation. However uniformity ratio and micronaire reading did not show any significant differences in both seasons, due to varying irrigation interval and/or nitrogen level while, the interaction had significant effect on these traits. Abd El- Gawad *et al* (1987)and Elayan (1992) reported that, fiber length, fiber strength and Micronaire reading were not significantly affected by nitrogen level. These results are not in harmony with those of Abd El-Hafeez *et al* (2000).

Table (8): Main effects of irrigation and fertilization on some fiber properties of Giza 90 cotton variety in the two seasons.

Main Effects	Fiber length at 2.5% S.L		Fiber length at 50% S.L		Fiber uniformity ratio (UR)		Fiber strength gram / tex		Fiber elongation %		Micronaire reading	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
A- Irrigation treatments:												
1- Every 15 days	31.23	31.62	13.90	14.91	48.33	47.38	28.93	28.70	6.32	6.36	4.14	4.03
2- Every 25 days	31.39	31.47	14.51	14.66	46.90	47.56	29.11	28.60	6.56	6.38	4.05	3.98
3- Every 25/15 days	31.68	31.31	14.77	14.65	47.88	46.32	29.45	28.23	6.73	6.40	4.05	4.02
4- - Every 15/25 days	31.78	31.73	13.96	15.01	46.75	46.27	29.11	27.27	6.79	6.53	4.09	4.05
L.S.D. 5%	0.16	0.13	0.62	0.11	NS	NS	0.36	0.92	0.25	0.11	NS	NS
B- Nitrogen levels:												
1- 15 kg N / fed	31.62	31.45	14.24	14.71	47.56	47.13	29.80	28.26	6.49	6.30	4.10	4.04
2- 30 kg N/ fed	31.26	31.61	14.43	14.73	47.20	46.79	28.52	28.48	6.56	6.36	4.07	4.07
3- 45 k g N /fed	31.69	31.55	14.93	14.98	47.65	46.72	29.14	27.87	6.75	6.60	4.02	3.95
L.S.D. 5%	0.22	NS	0.52	0.12	NS	NS	0.83	0.46	0.13	0.17	NS	NS

Table (9): The effect of first order interaction of irrigation and fertilization on some fiber properties of Giza 90 cotton variety in the two seasons.

Treatments	Fiber length at 2.5% S.L			Fiber length at 50% SL			Fiber uniformity ratio (UR)			Fiber strength gram/tex			Fiber elongation%			Micronaire reading		
	Nitrogen levels:			Nitrogen levels:			Nitrogen levels:			Nitrogen levels:			Nitrogen levels:			Nitrogen levels:		
A- Irrigation treatments:	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed	15 Kg N/fed	30 Kg N/fed	45 Kg N/fed
	1st season																	
1- Every 15 days	31.11	30.18	31.44	13.51	13.71	14.46	49.02	48.85	47.12	26.50	29.83	30.48	6.00	6.41	6.55	4.20	4.25	3.98
2- Every 25 days	31.50	30.10	32.58	14.50	14.51	14.75	46.08	46.65	48.00	29.48	28.48	29.36	6.66	6.55	6.46	3.96	3.91	4.21
3- Every 25/15 days	32.27	31.58	31.25	14.75	14.75	14.83	48.83	46.56	48.26	28.97	28.91	29.57	7.61	6.58	7.00	4.21	3.96	3.98
4- Every 15/25 days	31.63	32.18	31.53	14.18	15.00	15.70	46.36	46.75	47.20	29.18	29.38	29.83	6.70	6.70	6.98	4.01	4.15	3.98
L.S.D. 5%	1.85			1.24			2.27			1.86			0.53			0.23		
A- Irrigation treatments:	2nd season																	
1- Every 15 days	31.61	31.53	31.21	14.68	15.00	15.06	47.65	47.56	36.93	27.88	26.21	27.73	6.03	6.20	6.86	4.03	4.11	3.95
2- Every 25 days	31.63	31.25	31.00	15.11	13.96	14.91	48.20	47.48	47.00	27.41	28.88	28.40	6.38	6.58	6.20	3.91	4.05	4.00
3- Every 25/15 days	31.50	31.06	31.06	14.43	14.93	14.60	47.23	45.30	46.43	28.01	28.55	29.25	6.25	6.38	6.58	4.21	4.03	3.88
4- Every 15/25 days	31.05	32.35	31.36	14.63	15.05	15.36	45.45	46.80	46.55	28.16	29.10	28.55	6.53	6.28	6.78	4.00	4.10	4.05
L.S.D. 5%	0.98			0.93			2.66			2.21			0.45			0.24		

Water consumptive use (WCU) and water use efficiency (WUE):-

Table (10) shows that, there was a gradual decrease in WCU as irrigation intervals was increased where the lowest water consumptive use was detected by irrigation at 25 days interval (2041.33 and 2311.79 m^3/fed respectively). This irrigation interval produced the highest WUE, viz. which amounted to: 0.608 and 0.579 in 2002 and 2003 seasons respectively .

Table (10): Water consumptive use (WCU) m^3/fed, seed cotton yield (SCY) (Kg/fed) and water use efficiency (Kg seed cotton /m^3) water during the 2002 and 2003 seasons.

Irrigation intervals days	Seed cotton yield (kg/fed)		WCU m^3/fed		WUE kg seed cotton /m^3	
	2002	2003	2002	2003	2002	2003
15	1214.32	1310.40	3459.92	3597.20	0.350	0.364
25	1242.67	1340.32	2041.33	2311.79	0.608	0.579
25/15	1464.75	1393.87	2765.36	2836.48	0.529	0.491
15/25	1500.97	1482.07	2899.57	2937.25	0.517	0.504

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إنتاجية صنف القطن جيزة ٩٠ تحت توقيتات ري ومستويات تسميد نتروجيني مختلفة

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أجري هذا البحث في محطة التجارب والبحوث الزراعية بكلية الزراعة جامعة القاهرة خلال موسمي ٢٠٠٢ ، ٢٠٠٣ لدراسة استجابة صنف القطن جيزة ٩٠ لفترات مختلفة من الري (١٥ يوم ، ٢٥ يوم ، ٢٥ يوم خلال مرحلة النمو الخضري ثم ١٥ يوم في مرحلة الأزهار والأثمار ، ١٥ يوم خلال مرحلة النمو الخضري ثم ٢٥ يوم في مرحلة الإزهار والإثمار وكذلك التسميد النيتروجيني بمعدلات ١٥ ، ٣٠ ، ٤٥ كجم أزوت للفدان تحت نظام القطع المنشقة حيث طبقت معاملات الري في القطع الرئيسية والتسميد في القطع المنشقة لتحديد أفضل فترات الري وأحسن معدل سماد نتروجيني تعطي أعلي محصول وجودة وكذلك تحديد الاستهلاك المائي وكفاءة استخدام الماء.

وكانت أهم النتائج المتحصل عليها :-

- أثرت فترات الري تأثيرا معنويا علي طول النبات ، ارتفاع أول عقدة ثمرية ، عدد الأفرع الثمرية وعدد اللوز للنبات وزن اللوزة ، محصول القطن الزهر للنبات والفدان ، نسبة التيلة ونسبة التبكير وكان أعلي محصول قطن زهر عند استعمال معاملة الري (١٥/٢٥ يوم) حيث أعطي ٢٨٩٩,٥٧ ، ٢٩٣٧,٢٥ كجم قطن زهر /فدان في كلا الموسمين علي التوالي .كما أثرت فترات الري علي معظم صفات الألياف مثل طول ومتانة واستطالة الألياف .
- أثر التسميد معنويا علي كلا من طول النبات (موسم أول) ، ارتفاع أول عقدة ثمرية، وزن اللوزة (موسم ثاني) ، محصول القطن الزهر للنبات والفدان ، نسبة التيلة ونسبة التبكير . وأمكن الحصول علي أعلي محصول قطن زهر عند استعمال ٤٥ كجم أزوت للفدان حيث كان المحصول ١٤٣٤,٨٢ ، ١٣٨٢,٨٥ كجم زهر/فدان للموسمين علي التوالي .
- أثر التفاعل بين الري والتسميد معنويا علي معظم الصفات تحت الدراسة حيث تحقق أعلي محصول من القطن الزهر بإتباع فترة ري قصيرة خلال مرحلة النمو الخضري (١٥ يوم) ثم فترة ري طويلة خلال مرحلة النمو الثمري (٢٥ يوم) مع إضافة ٣٠ كجم نتروجين/ للفدان ..
- قل الاستهلاك المائي بالري كل ٢٥ يوم كما زادت كفاءة استخدام الماء وقد أمكن بإتباع نظام فترات الري المتقدم (١٥ / ٢٥) توفير ٥٦٠,٣٥ ، ٦٥٩,٩٥ م^3 / فدان خلال موسمي الدراسة مقارنة بالري كل ١٥ يوم مع إضافة ٣٠كجم نتروجين/فدان حيث تحقق أعلي محصول قطن زهر / للفدان .