Annals of Agric. Sc., Moshtohor,
Vol. 33(2):465-481, 1995.

EFFECT OF PLANTING DATE, N AND P APPLICATION LEVELS ON THE YIELD OF GIZA 80 COTTON CULTIVAR

BY

El-Debaby, A.S.*; Hammam, G.Y.* and Nagib, M.A.**
* Agron. Dept., Fac. of Agric. Moshtohor, Zagazig Univ., Egypt.
** Cotton Res. Inst., Agric. Res., Giza, Egypt.

ABSTRACT

Two field experiments were carried out during 1988 and 1989 seasons at Sids Agricultural Research station, Beni-Suef Governorate to study the effect of planting dates, N levels, and P fertilization on yield and yield components of Giza 80 cotton cultivar. The results could be summarized as follows:

The total number of fruiting branches, number of bolls/plant, number of opened bolls/plant, boll weight and seed cotton yield significantly increased by early planting. Whereas, first picking percentage significantly increased by delaying sowing date.

Increasing N level to 60 kg/fed significantly increased number of fruiting branches/plant, and seed cotton yield/plant. Also, number of bolls and number of opened bolls/plant and seed cotton yield (kentar/fed.) were increased with the increase in N levels to 90 kg/fed.

P fertilization resulted in an increase in number of bolls/ plant, number of opened bulls/plant and seed cotton yield.

The interaction effects between sowing dates, N levels, and P fertilization were significant on most of the studied traits in both seasons.

INTRODUCTION

In Egypt, cotton acreage tended to decrease sharply in the last decades in spite of the efforts of the Egyptian Ministry of Agriculture to encourage cotton production and to support cotton growers. Increasing cotton yield may compensate the serious reduction in cotton area. Therefore, many attempts have been made to increase the yield potentiality of cotton crop through cultural treatments. Sowing date and the application of N and P fertilization are among the cultural practices which greatly affect cotton productivity. Several studies revealed that early sowing of cotton increased yield and most of its components (Karam, 1980; Shafshak *et al.*, 1987 and Shalaby *et al.*, 1989). Yasseen (1986).

and Ismail and Ismail (1987) concluded that N is an important element affecting seed cotton yield/plant and per feddan. number of opened bolls/plant and boll weight. Also application of P fertilization increased seed cotton yield and some of its components (Ismail and Ismail. 1987 and Hosny *et al.*, 1989).

The present investigation aims to study the effect of planting date. N and P fertilizers on yield and yield components of Giza 80 cotton cultivar.

MATERIALS AND METHODS

This study was carried out at Sids Agricultural Station. Beni-Suef Governorate. during 1988 and 1989 season. It aimed to study the effect of five sowing dates. three N levels and two P levels in the yield and yield components of Giza 80 cotton cultivar. Each trial included 30 treatments which were the combination of 5 planting dates (15/3, 1/4, 15/4, 1/5 and 15/5). 3 N levels (30, 60 and 90 kg N/fed.) and 2 P levels (zero and 30 kg P_2O_5/fed.). N fertilizer as urea (46.5% N) was applied at 2 equal doses, the first was applied after thinning and the second one was added 2 weeks later. P fertilizer as calcium superphosphate (15.5% P_2O_5) was applied after planting and before irrigation. Maize was the preceding crop in both seasons. Normal cultural practices used in cotton production were followed. The soil of the experiments was clay in texture. A split plot design with 4 replication was used. The main plots were occupied by planting dates and the subplots were devated to the 6 treatments which were the combination of N and P levels. The subplot area was 14.7 m^2. The following characters were recorded: Number of fruiting branches per plant, number of total bolls produced per plant, number of opened bolls per plant at harvest, boll weight, in grams estimated by dividing the seed cotton yield of the ten plants by the number of bolls, seed cotton yield per plant in grams, estimated as the average of seed cotton weight of the ten plants, seed cotton yield in kentar/fed estimated on the whole plot basis and earliness percentage.

RESULTS AND DISCUSSION

A- Effect of sowing date:

Number of fruiting branches per plant was significantly affected by sowing dates (Table. 1). The highest value of this character (9.96) was produced by cotton plants sown at Mid March in 1988 and at the beginning of April in 1989. The lowest number of fruiting branches was produced by cotton plants sown at Mid May in both seasons. This relationship could be attributed to the relatively longer period of vegetative growth for early sown plants. These results are in harmony with these obtained by Dawood (1980). Karam (1980) and Yasseen (1986).

Results in Table (1) indicate that total number of bolls produced per plant significantly increased by early sowing, where the highest number of bolls

Table (1): Effect of sowing dates on yield and yield components of cotton in 1988 and 1989 seasons.

Characters / Sowing date	Number of fruiting branches/ plant	Number of [illegible] bolls/ plant	Number of opened bolls/ plant	Boll weight (g)	Seed cotton yield/ plant (g)	Seed cotton yield in kentar/ fed	First picking percentage (%)
1988 season							
March 15 th	9.96	13.93	12.45	2.57	29.75	11.42	33.38
April 1 st	9.74	13.63	12.06	2.52	25.52	10.94	54.97
April 15 th	9.17	11.80	9.84	2.54	22.31	8.72	67.61
May 1st	9.04	10.28	7.46	2.47	16.65	8.02	71.07
May 15 th	8.71	10.37	5.63	2.27	12.73	6.07	83.75
L.S.D 0.05	0.60	0.53	0.46	0.12	1.25	1.07	2.31
0.01	0.84	0.74	0.64	0.16	1.76	1.50	3.24
1989 season							
March 15 th	9.89	12.85	11.01	2.50	27.14	12.47	33.42
April 1 st	10.43	12.83	11.18	2.47	26.95	12.33	54.45
April 15 th	10.07	12.52	9.76	2.27	22.78	10.09	68.37
May 1st	9.49	12.48	9.07	2.12	19.82	7.79	70.66
May 15 th	8.52	9.56	3.43	2.07	7.75	4.11	83.74
L.S.D 0.05	0.57	0.66	0.43	0.17	1.84	1.16	2.17
0.01	0.79	0.93	0.61	0.24	2.58	1.63	3.04

per plant was produced by cotton plants sown early on March 15th (13.93 bolls). Delaying sowing date to the beginning of May decreased number of bolls per plant to 10.28 bolls in the first season. Similar results were obtained in 1989. This result can be explained on the basis of a longer growing season and better utilization of soil nutrients, as well as escaping of cotton plants from the boll worm infestation (El-Shinnawy *et al.*, 1983).

Number of opened bolls per plant at harvest was significantly affected by sowing dates in both seasons (Table 1). Sowing cotton plants on March 15th in the first season caused significant increase in this character. Delaying sowing cotton to May 15th caused a remarkable decrease in number of opened bolls per plant in both seasons. The decrease of opened bolls number due to late sown plants could be attributed to the shorter period of growth in plants sown late than in those sown early. Similar results were reported by Shahine (1986).

Results in Table (1) showed that the effect of planting dates on boll weight was highly significant in both seasons. The highest boll weight (2.57 g) was obtained from plants sown on March 15th then followed by those sown on April first. The lowest boll weight (2.27 g) was given by plants sown late on Mid May in the first season. Similar results were obtained in the second season. It could be concluded that delaying cotton sowing up to the beginning of mid May reduced boll weight considerably. These results are in good agreement with those reported by Dawood (1980), and Shalaby *et al.* (1989).

Sowing early on March 15th caused a considerable increase in seed cotton yield per plant compared to late sowing in both seasons (Table. 1). Delaying sowing date constantly decreased seed cotton yield/plant until it reached the lowest value in plants sown at mid May in the two studied seasons. The increase in seed cotton yield/plant due to sowing early is the result of the increase in number of total bolls and opened bolls per plant as well as boll weight. Similar results were reported by Karam (1980), and Yasseen (1986).

Data shown in Table (1) revealed that the effect of planting dates on this character was highly significant in both seasons. In 1988 delaying sowing date from mid March to mid April significantly reduced seed cotton yield/feddan by 2.7 kentars. Further delaying up to mid May produced a reduction of 5.35 kentars per fed. Similar results were obtained in 1989. Plants sown early had a longer period of growth, flowering and maturity which contributed to high seed cotton yield. These results are in harmony with those obtained by Karam (1980), Shafshak *et al.* (1987) and Shalaby *et al.* (1989).

Results in Table (1) show that delaying sowing date from March 15th to May 15th trended to increase the values of first picking percentage gradually in 1988. Delaying sowing date constantly increased first picking percentage until it reached the lowest value in plants sown early at mid March. In 1989 it was also clear that delaying sowing date of cotton seeds caused a significant and

remarkable increase in the first picking percentage. Similar results were reported by Karam (1980).

B- Effect of N fertilizer level:

Data presented in Table (2) revealed that number of fruiting branches was significantly affected by N level in both seasons. Increasing N levels from 30 up to 60 kg N/fed increased this character. Moreover, further increase in N levels up to 90 kg N/fed. decreased number of fruiting branches in both season. The increase in number of fruiting branches per plant due to the increase in N levels may be attributed to the increase in meristemic activity. These results are in harmony with those obtained by Shafshak it al. (1983). Abd El-Gawad *et al.* (1985).

Increasing N levels from 30 up to 60 and 90 kg N/fed. increased number of bolls per plant from 11.53 to 12.02 and 12.46, respectively without significant differences between 60 and 90 kg/fed. in 1988 (Table, 2). In 1989, number of green bolls per plant increased by increasing N level from 30 to 60 kg N/fed. Further increase in N level caused a slight and insignificant increase in this trait (Table, 2). These results agree with those obtained by Girgis (1972) and Shafshak *et al.* (1983).

Results presented in Table (2) indicated that number of opened bolls per plant significantly increased by increasing N levels to cotton plants in both season. Increasing N levels up to 60 kg N/fed. increased number of opened bolls/plant from 9.20 to 9.76 in 1988. Further increase in N level reduced number of opened bolls/plant. This result was true in 1989. Such increase in number of opened bolls/plant as a result of applying 60 kg N/fed. might be due to the fact that N is an essential nutrient for controlling the new growth and abscission of squares and bolls (Sawan, 1985).

The effect of N level on boll weight is shown in Table (2). Boll weight was not affected by N levels. This was clear in both seasons. These results are in agreement with those obtained by Abd El-Gawad *et al.* (1985), and El-Halawany and Azab (1989).

Results in Table (2) indicated that N level significantly affected seed cotton yield/plant in both seasons Increasing N levels from 30 to 60 kg N/fed. exerted a significant increase in seed cotton yield/plant (5.04%)in 1988. Further increase in N level caused a reduction in this trait. Similar results were obtained in 1989. The increase in seed cotton yield/plant due to raising N level from 30 to 60 kg N/fed. is mainly a result of the increase in number of fruiting branches/plant, weight of seed cotton per boll and dry matter accumulation. Similar results were reported by Shafshak *et al.* (1983). Mohamed *et al.* (1984) and Ismail and Ismail (1987).

N application had a significant effect on seed cotton yield/fed. in both seasons as shown in Table (2). Increasing nitrogen level from 30 to 60 and 90 kg N/fed. led to an increase in seed cotton yield in kentar/fed. by 13.05 and 10.60% as compared with 30 kg N/fed. in 1988 respectively. It is clear that 60 kg N/fed. gave the highest yield of seed cotton per fed. Similar results were obtained in the second season. It could be concluded that the highest seed cotton yield/fed. was obtained from plant given 60 kg N/fed. This result is expected since N increased cotton growth and most of its yield components. These results coincide with those obtained by Abd El-Gawad *et al.* (1985), and Ismail and Ismail (1987).

Data illustrated in Table (2) indicated that the first picking percentage was significantly affected by N level in both seasons. The highest level of N (90 kg N/fed.) reduced the percentage of seed cotton yield obtained at the first pick to 58.24%. Whereas, the lowest N level (30 kg N/fed.) gave the highest percentage of seed cotton yield obtained at the first pick (67.26%). In 1989 similar trend was observed, where first picking percentage decreased with the increase in N level from 30 to 60 and 90 kg N/fed.

C- Effect of P level:

P fertilization did not show any significant effect on number of fruiting branches per plant and boll weight in both seasons as illustrated in Table (3).

The effect of P fertilization on the number of green bolls/plant in both seasons is shown in Table (3). P application at 30 kg P_2O_5/fed. tended to increase the number of bolls/plant by 0.38 bolls in the first season and 0.40 bolls in the second one compared with the unfertilized plants.

P applied at 30 kg P_2O_5/fed. increased number of opened bolls per plant to 6.30 and 3.67% in both seasons, respectively compared with the unfertilized plants (Table 3). The effect of P may be due to that P regulates enzymatic processes and P also acts as an activator of some enzymes which may affect boll formation and stability.

Data presented in Table (3) indicated that seed cotton yield/plant was significantly affected by P application, where the highest yield/plant (21.98 and 21.45 g) was obtained by applying 30 kg P_2O_5/fed. in both seasons, respectively compared with 20.81 and 20.23 g for unfertilized plants. The higher yield/plant with the application of P may be the result of the increase in number of opened bolls/plant and boll weight due to the important role of P in physiological processes in cotton plant. Similar results were reported by Ismail and Ismail (1987) and Hosny *et al.* (1989).

P application exerted a significant effect on seed cotton yield/fed. in both seasons. (Table 3). Application of P at 30 kg P_2O_5/fed. led to an increase in seed cotton yield by 9.93 and 6.77% as compared with zero P_2O_5/fed. in 1988

Table (2): Effect of nitrgen fertilizer level on yield and yield components of cotton in 1988 and 1989 seasons.

Characters / Nitrogen fertilizer level	Number of fruiting branches/ plant	Number of total bolls/ plant	Number of opened bolls/ plant	Boll weight (g)	Seed cotton yield/ plant (g)	Seed cotton yield in kentar/ fed.	First picking percentage (%)
1988 season							
30 kg N/fed.	9.15	11.53	9.20	2.49	20.45	8.38	67.26
60 kg N/ fed.	9.66	12.02	9.78	2.46	22.36	9.47	60.98
90 kg N/fed.	9.28	12.46	9.48	2.46	21.36	9.26	58.24
L.S.D. 0.05	N.S.	0.44	0.35	N.S.	0.99	0.51	0.88
0.01	N.S.	0.48	0.46	N.S.	1.32	0.68	1.16
1989 season							
30 kg N/fed.	9.55	11.62	8.63	2.29	20.24	9.09	67.01
60 kg N/ fed.	9.81	12.24	9.09	2.30	21.78	9.97	60.73
90 kg N/fed.	9.68	12.29	8.96	2.27	20.64	9.55	58.65
L.S.D. 0.05	0.29	0.37	0.26	N.S.	0.91	0.36	1.04
0.01	N.S.	0.48	0.35	N.S.	1.21	0.48	1.37

Table (3): Effect of phosphorus fertilization on yield and yield components of cotton in 1988 and 1989 seasons.

Character / phosphorus fertilizer level s	Number of fruiting branches/ plant	Number of green bolls/ plant	Number of opened bolls/ plant	Boll weight (g)	Seed cotton yield/ plant (g)	Seed cotton yield in kentar/ fed.	First picking percentage (%)
1988 season							
Zero P_2O_5/ fed.	9.35	11.81	9.20	2.49	20.81	8.61	61.75
30 kg P_2O_5/ fed.	9.39	12.19	9.78	2.45	21.98	9.46	62.56
L.S.D 0.05	N.S.	0.36	0.28	N.S.	0.81	0.42	0.72
0.01	N.S.	N.S.	0.38	N.S.	1.07	0.55	N.S.
1989 season							
Zero P_2O_5/ fed.	9.64	11.85	8.73	2.29	20.33	9.23	61.67
30 kg P_2O_5/ fed.	9.72	12.25	9.05	2.29	21.45	9.85	62.60
L.S.D 0.05	N.S.	0.30	0.68	N.S.	0.74	0.30	0.85
0.01	N.S.	0.39	0.90	N.S.	0.99	0.39	N.S.

and 1989 season, respectively. The higher yield per feddan due to the application of P may be the result of the increase in number of opened bolls/plant and boll weight (Hosny *et al.*, 1989)

Data in Table 3 revealed that the earliness character measured as percentage of first pick or total yield (62.56%) produced from plant fertilized by 30 kg P_2O_5/fed. Whereas, unfertilized plants produced the lowest percentage of first pick (61.75%). Similar results were obtained in 1989 where higher percentage of first pick (62 59%) was obtained by application of 30 kg P_2O_5/fed. While, lower percentage of first pick (61.67%) was obtained by unfertilized plants.

D- The Interaction effects:

1- Sowing date x Nitrogen levels;

The interaction effect between sowing date and N levels was significant on number of green bolls/plant, number of opened bolls/plant, and seed cotton yield/plant in both seasons; and boll weight and seed cotton yield in kentar per feddan in 1989 (Tables, 4- 8).

The highest number of bolls/plant was obtained by sowing cotton plants on March 15th with 90 kg N/fed. In 1988 and April 1st with 90 kg N/fed. in 1989 (Table, 4). Sowing cotton early on April 1st with 60 kg N/fed. produced the highest number of opened bulls/plant in both seasons (Table, 5). Also highest boll weight (2.60 g) was obtained from sowing on April 1st with application of 30 kg N/fed. For seed cotton yield/plant, planting on March 15th with 30 kg N/fed. and April 1st with 60 kg N/fed. produced the highest values for this trait in 1988 and 1989, respectively, (Table, 7). Sowing cotton plants early on March 15th with 60 kg N/fed. produced the highest seed cotton yield/fed. which was 13.15 kentars/fed (Table, 8).

2- Sowing date x P fertilization:

Boll weight and seed cotton yield/plant were significantly affected by the interaction between sowing date and P fertilization in 1988 season only (Tables 9 and 10). Whereas, first picking percentage was significantly affected in both seasons (Table, 11). It is clear that, sowing cotton on mid April with 30 kg P_2O_5/fed. gave the highest boll weight (2.62 g). Early sowing on March 15th with 30 kg P_2O_5/fed. produced the highest seed cotton yield/plant (31.05 g) Results in Table (11) indicated that delaying sowing of cotton to may 15th with 30 kg P_2O_5/fed produced the highest percentage of first picking in both seasons

3- Interaction between N levels and P fertilization:

The interaction effect between N levels and P fertilization was significant for seed cotton yield/plant and first picking percentage in 1989 only (Tables 12 and 13). The highest seed cotton yield/plant (21.88 g) was obtained

Table (4): The interaction effect between sowing date and nitrogen level on number of total bolls/ plant of cotton in 1988 and 1989 seasons.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
1988 season				
March 15 th	13.33	13.85	14.61	13.93
April 1 st	13.15	13.99	13.75	13.63
April 15 th	11.65	11.02	12.72	11.80
May 1 st	9.46	10.17	11.20	10.28
May 15 th	10.05	11.06	10.01	10.37
Mean	11.53	12.02	12.46	
L.S.D 0.05	0.98			
0.01	1.30			
1989 season				
March 15 th	12.30	13.16	13.09	12.85
April 1 st	11.90	13.15	13.45	12.83
April 15 th	12.46	12.82	12.27	12.52
May 1 st	11.86	13.02	12.55	12.48
May 15 th	9.56	9.05	10.07	9.56
Mean	11.62	12.24	12.29	
L.S.D 0.05	0.82			
0.01	1.08			

Table (5): Effect of the interaction between sowing date and nitrogen fertilizer level on number of opened bolls per plant of cotton in 1988 and 1989 seasons.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
1988 season				
March 15 th	12.39	12.42	12.54	12.45
April 1 st	11.11	12.86	12.21	12.06
April 15 th	9.90	9.35	10.27	9.84
May 1 st	7 17	7.92	7.29	7.46
May 15 th	5.42	6.36	5.10	5.63
Mean	9.20	9.78	9.48	
L.S.D 0.05	0.78			
0.01	1.03			
1989 season				
March 15 th	10.55	11.46	11.02	11.01
April 1 st	10.32	11.61	1.60	11.18
April 15 th	9.51	9.66	10.11	9.76
May 1 st	9.16	9.79	8.31	9.09
May 15 th	3.62	2.82	3.72	3.43
Mean	8.63	9.09	8.96	
L.S.D 0.05	0.59			
0.01	0.78			

Table (6): Effect of the interaction between sowing date and nitrogen fertilizer level on boll weight of cotton (g) in 1988 season.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
March 15 th	2 59	2 44	2.47	2.50
April 1 st	2 60	2 34	2.49	2.47
April 15 th	2 30	2 31	2 21	2 27
May 1 st	2 00	2.29	2.09	2 12
May 15 th	1 99	2 15	2 09	2 07
Mean	2.49	2.46	2.46	
L.S.D 0.05	0.19			
0.01	0.26			

Table (7): Effect of the interaction between sowing date and nitrogen fertilizer level on seed cotton yield per plant (g) in 1988 and 1989 seasons.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
1988 season				
March 15 th	31.07	29.81	28.36	29.75
April 1 st	21.99	28.14	26.45	25.52
April 15 th	22.62	20.16	24.14	22.31
May 1 st	14.37	18.60	16.82	16.65
May 15 th	12.05	15.09	11.05	12.73
Mean	20.45	22.36	21.36	
L.S.D 0.05	2.22			
0.01	2.94			
1989 season				
March 15 th	26.80	27.57	27.04	27.14
April 1 st	26.57	26.94	27.34	26.95
April 15 th	21.37	23.94	23.02	22.78
May 1 st	18.49	23.15	17.81	19.82
May 15 th	7.97	7.30	7.99	7.75
Mean	20.24	21.78	20.64	
L.S.D 0.05	2.04			
0.01	2.68			

Table (8): Effect of the interaction between sowing date and nitrogen fertilizer level on seed cotton yield in kentar per faddan in 1989 season.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
March 15 th	11 93	13 15	12 33	12.47
April 1 st	12 40	12 53	12 07	12 33
April 15 th	9 59	11 84	11 54	10 99
May 1 st	7 19	8 35	7 82	7 79
May 15 th	4 33	4 00	3 99	4 11
Mean	9.09	9 97	9 52	
L.S.D 0.05	0.81			
0.01	1.07			

Table (9): The interaction effect between sowing date and phosohorus fertilization on boll weight (g) of cotton in 1988 season.

Sowing date	Phosphorus fertilization level		Mean
	Zero P2O5/ fed.	30 kg P2O5/ fed.	
March 15 th	2.60	2.54	2.57
April 1 st	2.58	2.47	2.52
April 15 th	2.46	2.62	2.54
May 1 st	2.47	2.47	2.47
May 15 th	2.37	2.17	2.27
Mean	2.49	2.45	
L.S.D 0.05	0.13		
0.01	0.18		

Table (10): The interaction effect between sowing date and phosohorus fertilization on seed cotton yield per plant (g) in 1988 season.

Sowing date	Phosphorus fertilization level		Mean
	Zero P2O5/ fed.	30 kg P2O5/ fed.	
March 15 th	28.45	31.05	29.75
April 1 st	24.12	26.92	25.52
April 15 th	22.17	22.40	22.31
May 1 st	16.15	16.81	16.65
May 15 th	12.76	12.70	12.73
Mean	20.81	21.98	
L.S.D 0.05	1.82		
0.01	2.40		

Table (11): The interaction effect between sowing date and phosohorus fertlization on first picking percentage of cotton (%) in 1988 and 1989 seasons.

Sowing date	Phosphorus fertilization level		Mean
	Zero P2O5/ fed.	30 kg P2O5/ fed.	
1988 season			
March 15 th	32.84	33.92	33.38
April 1 st	54.38	55.57	54.97
April 15 th	68.00	67.22	67.61
May 1 st	71.11	71.02	71.07
May 15 th	82.43	85.07	83.75
Mean	61.75	62.56	
L.S.D 0.05	1.61		
0.01	2.12		
1989 season			
March 15 th	32.70	34.15	33.42
April 1 st	53.67	55.23	54.45
April 15 th	69.18	70.84	68.37
May 1 st	70.48	70.84	70.66
May 15 th	82.29	85.19	83.74
Mean	61.67	62.60	
L.S.D 0.05	1.89		
0.01	2.50		

Table (12): The interaction effect between nitrogen and phosphorus fertilization levels on seed cotton yield per plant (g) in 1989 season.

Nitrogen fertilization level	Phosphorus fertilizer level		Mean
	Zero P2O5 /fed.	30 kg P2O5 /fed.	
30 kg N /fed.	20 12	20.66	20.24
60 kg N /fed	21 88	21 53	21 78
90 kg N /fed.	19 73	21 20	20.64
Mean	20.33	21.45	
L.S.D 0.05	1.29		
0.01	N.S.		

from the application of 60 kg N/fed. with zero P_2O_5/fed. Whereas, the highest first picking percentage (67.62%) was obtained from the application of 30 kg N/fed. with 30 kg P_2O_5/fed. (Table, 13).

4- Sowing date X Nitrogen levels X P fertilization interaction:

Results in Table 14 indicated that boll weight was significantly affected by the second order interaction in 1989 only. The highest boll weight (2.85 g) resulted from sowing on April 1st with the application of 30 kg N/fed. and 30 kg P_2O_5/fed. Also, first picking percentage was significantly affected by interaction between sowing date, N and P levels in both seasons (Table, 15). Sowing on mid May with 30 kg N/fed. and 30 kg P_2O_5/fed. produced the highest value of this trait, being 90.35% and 88.97% for 1988 and 1989 season, respectively.

Table (13): The interaction effect between nitrogen and phosphorus fertilization levels on first picking percentage of cotton in 1989 season.

Nitrogen fertilization level	Phosphorus fertilizer level		Mean
	Zero P2O5 /fed.	30 kg P2O5 /fed.	
30 kg N /fed.	66.39	67.62	67.01
60 kg N /fed	59.55	61.91	60.73
90 kg N /fed.	59.05	58.24	58.65
Mean	61.67	62.60	
L.S.D 0.05	1.46		
0.01	1.94		

Table (14): The interaction effect between sowing date, nitrogen and phosphorus levels on boll weight of cotton (g) in 1989 season.

Sowing date	Nitrogen fertilizer level					
	30 kg N/fed.		60 kg N/ fed.		90 kg N/fed.	
	Phosphorus fertilizer level					
	0 kg /fe	30 kg /fed.	0 kg /fed	30 kg /fed.	0 kg /fed.	30 kg /fed.
March 15 th	2.55	2.62	2.35	2.52	2.52	2.42
April 1 st	2.35	2.85	2.47	2.20	2.55	2.42
April 15 th	2.25	2.35	2.35	2.27	2.20	2.22
May 1 st	2.05	1.97	2.25	2.32	2.02	2.15
May 15 th	2.10	1.87	2.12	2.17	2.20	1.97
Mean	2.26	2.33	2.31	2.30	2.30	2.34
L.S.D 0.05	0.27					
0.01	0.36					

Table (15): The interaction effect between sowing date, nitrogen and phosphorus levels on first picking percentage of cotton in 1988 and 1989 seasons.

Sowing date	Nitrogen fertilizer level					
	30 kg N/fed.		60 kg N/ fed.		90 kg N/fed.	
	Phosphorus fertilizer level					
	0 kg /fed.	30 kg /fed.	0 kg /fed	30 kg /fed.	0 kg /fed.	30 kg /fed.
1988 season						
March 15 th	37.15	36.52	30.32	35.47	31.05	29.77
April 1 st	57.20	63.20	55.52	53.17	50.42	50.32
April 15 th	73.57	72.20	66.37	65.80	64.05	63.67
May 1 st	76.72	76.62	69.82	69.82	66.77	66.62
May 15 th	89.02	90.35	79.47	83.97	78.88	80.90
L.S.D 0.05	2.78					
0.01	3.68					
1989 season						
March 15 th	37.10	36.52	29.62	35.77	31.37	30.15
April 1 st	56.77	63.55	53.17	52.30	51.07	49.85
April 15 th	74.07	72.77	66.62	66.72	66.85	63.17
May 1 st	75.92	76.30	69.00	69.52	66.52	66.70
May 15 th	88.07	88.97	79.35	85.23	79.45	81.35
L.S.D 0.05	3.27					
0.01	4.33					

REFERENCES

Abd El-Gawad, A.A.; Samra, A.M.; Ashoub, A.Y. and El-Kadi, B.M. (1985): Effect of nitrogen fertilizer and micronutrients, "Ferrous, Zinc and Manganese" on yield, yield components and plant height of Giza 75 cotton cultivar. Agric. Res. Review, 63(6): 87-97.

Dawood, A.M.M. (1980): Response of some cotton varieties to nitrogen fertilization at different planting dates. M.Sc. Thesis, Fac. Agric. Alexandria Univ., Egypt.

El-Halawany, S.H.E.M. and Azab, A.S.M. (1989): Influence of leaf defoliation and nitrogen fertilization on earliness yield and fiber quality. Annals of Agric. Sci. ISN, 253, 34(2):845-855.

El-Shinnawy, A.H.; Hosny, A.A. and Ghaly, F.M. (1983): Effect of sowing date and nitrogen level on yield and some yield components of Giza 80 cotton variety. Agric. Res. Review, 62: 101-111.

Girgis, E.A. (1972): Effect of some cultural methods on cotton yield and quality (irrigation and fertilization). M.Sc. Thesis, Fac. of Agric., Alexanderia Univ., Egypt.

Hosny, A.A.; Mohamed, H.M.H. and Kadry, W. (1989): Effect of plant density and phosphorus on yield and yield components of Giza 75 cotton variety. Annals of Agric., Sci. Moshtohor, 27(1):11-20.

Ismail, F.M. and Ismail, A.M. (1987): Response of upland cotton variety McNair 220. (*Gossypium hirsutum* L.) to nitrogen and phosphorus fertilization under the conditions of middle Egypt. Egypt. J. Agron. 7(2):101-110.

Karam, K.E. (1980): Effect of planting date and seeding rate on yield and quality of some cotton traits. M.Sc. Thesis, Fac. of Agric., El-Minia Univ. Egypt.

Mohamed, A.A.; Nassar, M.A. and Badr, S.K. (1984): Effect of plant density under different rates of nitrogen fertilization on two Egyptian cotton varieties. Res. Bull. Fac. of Agric., Univ. of Cairo, 35(1):241-256.

Sawan, Z.M. (1985): Effect of nitrogen fertilization and foliar application of calcium and microelements on yield, yield components and fiber properties of Egyptian cotton. Egypt. J. Agron. 10(1-2): 25-37.

Shafshak, S.E.; Kasem, M.M.; Sallam, A.A. and Awad, M.A. (1987): Effect of sowing date on yield components and lint proerties of the cotton varieties. Annals of Agric. Sc., Moshtohor, 25(2): 681-693.

Shafshak, S.E.; Salem, M.S.; El-Sayed, K.L. and Shahine, I.M. (1983a): Effect of different levels and forms of nitrogen fertilizer on Egyptian cotton Giza 69 cultivar. 2- Effect on yield and yield components. Annals of Agric. Sc., Moshtohor, 20(1):136-154.

Shahine, I.M.M. (1986): Effect of some cultural treatments on growth, yield and technological properties of cotton plant Kalubia Governorate. Ph.D. Thesis, Fac. of Agric. at Moshtohor, Zagazig Univ., Egypt.

Shalaby, E.M. (1972): Physiological response of cotton plants to planting date and population density. Ph.D. Thesis, Fac. Agric., Ain Shams Univ. Egypt.

Yasseen A F I H (1986) The relationship between yield and agronomic treatments for some Egyptian and American cotton varieties. Ph.D. Thesis. Fac of Agric Ain Shams Univ., Egypt

تأثير ميعاد الزراعة والتسميد الأزوتى والفوسفاتى على محصول القطن صنف جيزة ٨٠

عبدالحميد السيد الدبابى* - جابر يحيى همام* - محمد عبدالحكيم نجيب**

* قسم المحاصيل - كلية الزراعة بمشتهر - جامعة الزقازيق - مصر.

** معهد بحوث القطن - مركز البحوث الزراعية - الجيزة - مصر.

أقيمت تجربتان حقليتان فى محطة البحوث الزراعية بسدس - محافظة بنى سويف خلال عامى ١٩٨٨، ١٩٨٩م لدراسة تأثير خمس مواعيد زراعة (١٥ مارس، أول أبريل، ١٥ أبريل، أول مايو، ١٥ مايو) وثلاث مستويات من التسميد الأزوتى (٣٠، ٦٠، ٩٠ كجم ن/فدان) ومستويين من التسميد الفوسفاتى (صفر، ٣٠ كجم فو٢أ٥/فدان) على المحصول ومكوناته لصنف القطن جيزة ٨٠.

وتتلخص أهم النتائج فى الأتى:

- أدت الزراعة المبكرة إلى زيادة معنوية فى عدد الأفرع الثمرية للنبات وعدد اللوز الكلى والمتفتح للنبات ووزن اللوزة ومحصول القطن الزهر للفدان، بينما الزراعة المتأخرة أدت إلى زيادة معنوية فى النسبة المئوية للجنية الأولى.
- أدى التسميد الأزوتى حتى ٦٠ كجم ن/فدان إلى زيادة معنوية فى عدد الأفرع الثمرية للنبات ومحصول النبات من القطن الزهر، بينما إزداد عدد اللوز الكلى والمتفتح للنبات ومحصول القطن الزهر الزهر للفدان بزيادة التسميد الأزوتى حتى ٩٠ كجم ن/فدان.
- أدى التسميد الفوسفاتى إلى زيادة عدد اللوز الكلى والمتفتح للنبات وكذلك محصول القطن الزهر للفدان.
- كان للتفاعل بين مواعيد الزراعة والتسميد الأزوتى والفوسفاتى تأثرا معنويا على معظم الصفات تحت الدراسة فى كلا الموسمين.