

**EFFECT OF PLANTING DATE, N AND P APPLICATION LEVELS ON
GROWTH CHARACTERS OF GIZA 80 COTTON CULTIVAR
BY**

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ABSTRACT

Two field experiments were carried out during 1988 and 1989 to study the effect of five planting dates (March 15th, April 1st, April 15th, May 1st and May 15th), three N levels (30, 60 and 90 kg N/fed.) and two P levels (0 and 30 kg P₂O₅/fed.) on some growth characters of Giza 80 cotton cultivar. The results could be summarized as follows:

- Germination percentage, plant height and node number of the first fruiting branch increased as a result of late planting.
- Days from planting to first flower appearance significantly increased with early planting.
- Increasing N level increased plant height and number of days from planting to the opening of first flower.
- P fertilization decreased number of days from planting to the first flower opening.
- Plant height, node number of first fruiting branch and flowering date were significantly affected by interaction between sowing date and N level.
- Plant height and flowering date were significantly affected by sowing date X P level interaction.
- The interaction between N level and P level had significant effect on plant height.
- Sowing date x N level x P level interaction had significant effect on plant height and flowering date.

INTRODUCTION

The Egyptian cotton is considered an important source in national income. It played and is still playing an important role in the social, economic and political life of Egypt. Studying the effect of some cultural practices on the growth characteristics of such crop is of prime importance. Sowing date, N and P fertilizers are among those agricultural practices. Karam (1980), Yasseen (1986) and Eissa *et al* (1989) reported that early planting significantly increased cotton plant height and some other traits, while late planting shortened number of days to first flower appearance. Also, the application of N up to 45 or

60 kg N/fed. significantly increased plant height, number of first symbodia (Girgis, 1972; Shafshak *et al.*, 1983; and Mohamed *et al.*, 1984). Hosny *et al.*, (1989) reported that P levels, i.e., 15, 30 and 45 kg P_2O_5 /fed. had no significant effect on plant height.

The aim of this work is to study the effect of planting date, N and P fertilizer levels on some growth characters of Giza 80 cotton cultivar.

MATERIAL AND METHODS

Two field experiments were carried out at Sids Agricultural Research Station, Beni-Suef Governorate, during 1988 and 1989 seasons on the cotton cultivar Giza 80. Each trial included thirty treatments which were the combination of five sowing dates namely, March 15th, April 1st, April 15th, May 1st and May 15th; three levels of N; namely 30, 60 and 90 kg N/fed., and two P levels, i.e., zero and 30 kg P_2O_5 /fed. N fertilizer as Urea (46.5% N) was applied at two equal doses, the first half was applied after thinning and the second one was added two weeks later. P fertilizer as calcium superphosphate (15.5% P_2O_5) was applied after sowing and before irrigation.

Maize was the preceding crop in the two seasons. Normal cultural practices used in cotton production were followed.

The soil of the experiments was clay in texture. Table (1) shows the mechanical and chemical analysis of the soil.

The split plot design with four replications was used. The main plots were occupied by the five sowing dates and the sub-plots were assigned to six treatments which were the combination of three N levels and two levels of P. The sub-plot size was 14.7 m² (1/286 feddan) and consists of seven ridges (3.5 m in length and 60 cm in width). The distance between hills was 20 cm.

Ten plants were randomly chosen from the inner ridge of all sub-plots to evaluate the following characters:

- 1- Germination percentage: estimated as the actual number of germinating hills in the inner five ridges divided by the total hill numbers originally sown.
- 2- Plant height, in cm at picking: measured from the soil surface up to the upper part of plants.
- 3- Node number of the first fruiting branch.
- 4- Number of vegetative branches per plant.
- 5- Flowering date estimated as the number of days from planting to the first flower appearance in 50% of the cotton plants.

Data were statistically analysed using the method outlined by Sokal and Rohlf (1969). F.S.D. at 0.01 and 0.05 was used to compare between the treatment means.

RESULTS AND DISCUSSION

Table (1): Mechanical and chemical analysis of the experimental soil

Soil variable	1988 season	1989 season
Chemical analysis:		
Organic matter (%)	1.00	1.04
Available nitrogen (ppm)	33.70	28.30
Available phosphorus (ppm)	16.36	14.72
Avialable potach (ppm)	390.70	403.60
E.C. (M. mhos at 25oC)	0.70	0.65
Ca Co3 %	2.30	2.10
pH	7.80	7.80
Partical size Distribution:		
Coarse sand (%)	0.48	0.43
Fine sand (%)	16.02	13.02
Silt (%)	33.64	29.82
Clay (%)	49.86	55.73

Data were statistically analysed using the method outlined by Snedecor and Cochran (1967). L.S.D. at 0.01 and 0.05 was used to compare between the treatment means.

RESULTS AND DISCUSSION

A- Effect of sowing date:

Results in Table (2) show that germination percentage was significantly affected by sowing date in both seasons. In the two studied seasons the highest germination percentage was recorded from sowing on Mid April, whereas the lowest germination percentage was obtained from seeds sown on Mid March. The variation in germination percentage due to different sowing dates could be attributed to the environmental effects.

Data presented in Table (2) revealed that plant height was significantly affected by sowing dates, in both seasons. In 1988 delaying sowing to May 15th gave the tallest plants (92.92 cm), whereas the shortest plants (64.44 cm) were obtained from plants sown on March 15th. In 1989, the tallest plants (114.04 cm) were obtained from sowing on May 1st, while sowing on March 15th produced the shortest plants. The increase in plant height by delaying sowing date may be due to the favourable effects of climatic condition on cotton growth. Similar results were reported by Dawood (1980), and Yasseen (1986).

Node number of the first fruiting branch was significantly affected by sowing dates in both seasons (Table 2). In 1988, the first fruiting branch emerged at the ninth node in plants sown on mid March and the beginning of April. Delaying sowing date up to mid May contributed to first fruiting branch emergence at higher nodes of cotton stem. In 1989, similar trend was observed. These results are in harmony with those reported by Karam (1980) and Eissa *et al.*, (1989).

Number of vegetative branches was not significantly affected by sowing date in both seasons (Table 2). These results are in agreement with these obtained by Dawood (1980).

Flowering date was significantly affected by sowing date in both seasons (Table 2). In 1988, the plants sown early on March 15th produced their first flower after 90.54 days, whereas the late sown plants on May 15th produced their first flower after 65.95 days from planting. Similarly, early sowing prolonged the period of first flower initiation to 94.79 days from planting, whereas the latest sowing date shortened the mentioned period to 74.46 days from planting. It is obvious that the rate of growth in the late sown plants seemed to be faster than in early sown plants. Similar results were reported by Yousef (1981), Karam (1980) and Shahine (1986).

Table (2): Effect of sowing dates on growth characters of cotton plant in 1988 and 1989 seasons.

Characters Sowing date	Germination percentage	Plant height (cm)	Node No. of first fruiting branch	Number of vegetative branches/plant	Flowering date (days)
1988 season					
March 15 th	83.13	64.44	8.96	0.72	90.54
April 1 st	92.73	70.97	9.09	0.77	81.46
April 15 th	97.00	81.81	10.54	0.79	81.46
May 1st	95.26	90.38	10.28	0.67	72.46
May 15 th	96.26	92.92	10.91	0.74	65.96
L.S.D 0.05	3.88	4.13	0.40	N.S.	0.62
0.01	5.44	5.78	0.56	N.S.	0.86
1989 season					
March 15 th	96.34	78.67	9.92	1.11	94.79
April 1 st	97.98	85.37	10.14	1.11	85.87
April 15 th	99.55	103.62	10.40	1.32	77.96
May 1st	97.87	114.04	11.06	1.22	78.21
May 15 th	97.63	112.42	11.25	1.25	74.46
L.S.D 0.05	2.42	3.58	0.37	N.S.	1.10
0.01	N.S.	5.02	0.52	N.S.	1.54

B- effect of N Fertilizer level:

Data presented in Table (3) revealed that germination percentage was insignificantly affected by N fertilization levels in both seasons. It could be concluded that there was no relevance between N fertilizer and germination percentage, since the N treatment levels were applied after germination count.

Data illustrated in Table (3) indicated that increasing N level up to 90 kg N/fed. caused a remarkable increase in plant height. In both seasons, the height N level (90 kg/fed.) produced the tallest plants, whereas, the application of 30 kg N/fed. gave the shortest cotton plants. These increases in plant height resulted from the increase in number of internodes and/or an increase in the length of internodes of main stem due to the role of N in the meristematic tissues activity in cotton plant. Similar results were obtained by Nour El-Din (1970), Girgis (1972), Salamah (1975), Shafshak *et al.*, (1983-a), Abdallah (1986) and Yasseen (1986).

Data presented in Table (3) revealed that node number of first fruiting branch was insignificantly affected by N fertilizer level. These results are in agreement with those reported by Mohamed *et al.*, (1984).

Concerning N levels, data in Table (3) revealed clearly that there was no relevance between N levels and number of vegetative branches. These results are in harmony with those obtained by Dawood (1980) and Mohamed *et al.*, (1984).

Number of days from planting to the initiation of the first flower was significantly affected by N levels (Table, 3). The earliest flower was produced after 77.02 days from planting in 1988 by the application of 30 kg N/fed. The highest N level (90 kg N/fed.) significantly delayed number of days from planting to the initiation of the first flower to 80.1 days in the first season. Similar trend was observed in the second season.

C- Effect of P fertilizer level:

Results in Table (4) show that P fertilization had no significant effect on germination percentage, plant height, node number of the first fruiting branch, and number of vegetative branches per plant in both seasons. Whereas, flowering date was significantly affected by P fertilizer in both seasons. Data revealed that the earliest flower was produced after 78.06 and 81.75 days from plants fertilized by 30 and 60 kg P_2O_5 /fed. in the first and second season, respectively, while, the unfertilized plants produced their first flower later after 78.8 and 82.77 days from planting in the two respective seasons. These results coincide with those obtained by Ismail and Ismail (1987).

Table (3): Effect of nitrogen fertilizer level on growth of cotton plants in 1988 and 1989 seasons.

Characters Nitrogen fertilizer level	Germination percentage	Plant height (cm)	Node No. of first fruiting branch	Number of vegetative branches/ plant	Flowering date (days)
1988 season					
30 kg N/fed.	92.87	71.74	9.84	0.70	77.02
60 kg N/ fed.	92.75	80.90	10.10	0.74	78.15
90 kg N/fed.	93.34	87.71	9.93	0.77	80.10
L.S.D. 0.05	N.S.	2.34	N.S.	N.S.	0.43
0.01	N.S.	3.09	N.S.	N.S.	0.56
1989 season					
30 kg N/fed.	97.84	94.22	10.53	1.19	80.62
60 kg N/ fed.	97.80	98.10	10.69	1.24	82.57
90 kg N/fed.	97.98	104.15	10.44	1.17	83.57
L.S.D. 0.05	N.S.	2.32	N.S.	N.S.	0.61
0.01	N.S.	3.06	N.S.	N.S.	0.80

Table (4): Effect of phosphorus fertilization on growth of cotton in 1988 and 1989 seasons.

Character phosphorus fertilizer level s	Germination percentage (%)	Plant height (cm)	Node No. of first fruiting branch	No. of vegetative branches/ plant	Flowering date (days)
1988 season					
Zero P ₂ O ₅ / fed.	92.50	79.26	9.92	0.72	78.78
30 kg P ₂ O ₅ / fed.	93.47	80.97	10.00	0.75	78.07
L.S.D. 0.05	N.S.	N.S.	N.S.	N.S.	0.35
0.01	N.S.	N.S.	N.S.	N.S.	0.46
1989 season					
Zero P ₂ O ₅ / fed.	97.89	99.30	10.54	1.18	82.77
30 kg P ₂ O ₅ / fed.	97.90	98.35	10.56	1.22	81.75
L.S.D. 0.05	N.S.	N.S.	N.S.	N.S.	0.46
0.01	N.S.	N.S.	N.S.	N.S.	0.65

E- Effect of the interaction:**1- Sowing date x N fertilizer level:**

Results in Tables (5-7) indicated that the significant interaction effect between sowing date and N level was detected for plant height and flowering date in both seasons, and node number of the first fruiting branch in 1988 season. The tallest plants were obtained from planting on May 15th and applying 90 kg N/fed. in the first season and from planting on May 1st with 90 kg N/fed. in the second season (Table. 5). Whereas, the shortest plants resulted from sowing on March 15th with 30 kg N/fed and sowing on March 15th with 60 kg N/fed. in 1988 and 1989 season respectively. Sowing cotton early on March 15th and applying 30 kg N/fed. induced fruiting branches production at lower nodes (Table. 6).

Also, the earliest initiation of the first flower was recorded with plants sown on mid May and given 30 kg N/fed. whereas, latest appearance of the first flower was recorded for plants sown on mid March and given 90 kg N/fed. in the first season. Similar results were obtained in the second season. (Table. 7).

2- Sowing date x P fertilization:

The interaction effect between sowing date and P fertilization was significant on plant height in 1988 (Table. 8) and flowering date in 1989 (Table. 9).

The tallest plants were obtained from sowing on May 15th with 30 kg P₂O₅/fed. whereas, the shortest ones were recorded from sowing on March 15th with zero or 30 kg P₂O₅/fed. (Table, 8). The earliest flowering was produced after 73.58 days from sowing on May 15th with 30 kg P₂O₅/fed in 1989 (Table. 9)

3- N levels x P levels:

Table (10) illustrates the interaction effect between N and P fertilization levels on plant height which was significant in 1989 season only. The tallest plants were obtained from applying 90 kg N and 30 kg P₂O₅/fed. whereas the shortest ones were recorded from applying 30 kg N and 30 kg P₂O₅/fed.

4- Sowing date x N level x P level interaction:

The interaction between sowing date, N and P levels was significant on plant height (Table, 11) and flowering date (Table, 12) in both seasons. The tallest plants were produced from sowing on May 15th with 90 kg N/fed. and zero P₂O₅ in the first season and from sowing on May 1st with 90 kg N/fed. and zero P₂O₅ in the second season.

Concerning flowering date, the earliest initiation of the first flower was recorded with plants sown on mid May and given 60 kg N/fed and 30 kg P₂O₅/fed. in 1988 season and from plants sown on May 15th with 30 kg N/fed and 30 kg P₂O₅.

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Table (5): The interaction effect between sowing date and nitrogen level on height of cotton plants (cm) 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 <u>th</u>	59.25	64.94	69.12	64.44
April 1 <u>st</u>	61.77	74.64	76.51	70.97
April 15 <u>th</u>	75.96	81.46	88.17	81.87
May 1 <u>st</u>	85.50	89.44	96.21	90.38
May 15 <u>th</u>	76.24	94.01	108.50	92.92
L.S.D 0.05	5.23			
0.01	6.92			
1989 season				
March 15 <u>th</u>	77.75	76.75	81.50	78.67
April 1 <u>st</u>	81.12	83.50	91.50	85.37
April 15 <u>th</u>	93.50	106.87	110.50	103.62
May 1 <u>st</u>	110.25	112.75	119.12	114.04
May 15 <u>th</u>	108.50	110.62	118.12	112.42
L.S.D 0.05	5.18			
0.01	5.85			

Table (6): The interaction effect between sowing date and nitrogen level on node number of first fruiting branch of cotton plants (cm) in 1988 season.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
March 15 <u>th</u>	8.80	9.01	9.06	8.97
April 1 <u>st</u>	9.43	8.97	8.96	9.09
April 15 <u>th</u>	10.45	11.16	10.02	10.27
May 1 <u>st</u>	10.15	10.19	10.52	10.20
May 15 <u>th</u>	10.45	11.17	11.10	10.91
Mean				
L.S.D 0.05	0.51			
0.01	0.68			

Table (7): The interaction effect between sowing date and nitrogen level on flowering date of cotton plants (days) 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	89.37	90.62	91.62	90.54
April 1 st	80.75	81.37	82.25	81.46
April 15 th	79.12	82.37	83.62	81.70
May 1 st	71.25	71.75	74.37	72.46
May 15 th	64.62	64.62	68.62	65.96
Mean	77.02	78.15	80.10	
L.S.D 0.05	0.95			
0.01	1.26			
1989 season				
March 15 th	91.50	96.25	96.62	94.79
April 1 st	85.12	85.62	86.87	85.87
April 15 th	76.87	77.87	79.12	77.96
May 1 st	76.50	77.75	80.37	78.21
May 15 th	73.12	75.37	74.87	74.46
Mean	80.62	82.57	83.57	
L.S.D 0.05	1.36			
0.01	1.79			

Table (8): The interaction effect between sowing date and phosphorus application on plant height in 1988 season.

Sowing date	Phosphorus fertilization level		Mean
	Zero P ₂ O ₅ / fed.	30 kg P ₂ O ₅ / fed.	
March 15 th	64.50	64.37	64.44
April 1 st	66.98	74.97	70.97
April 15 th	82.07	81.66	81.87
May 1 st	91.79	88.97	90.38
May 15 th	90.97	94.85	92.92
Mean	79.26	80.97	
L.S.D 0.05	4.27		
0.01	5.65		

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Table (9): The interaction effect between sowing date and phosphorus fertilizer on flowering date (days from planting to first flower) in 1988 season.

Sowing date	Phosphorus fertilization level		Mean
	Zero P ₂ O ₅ / fed.	30 kg P ₂ O ₅ / fed.	
March 15 th	95.75	93.83	94.79
April 1 st	86.33	85.42	85.87
April 15 th	78.33	77.58	77.96
May 1 st	78.08	78.33	78.21
May 15 th	75.33	73.58	74.96
Mean	82.77	81.75	
L.S.D 0.05	1.11		
0.01	1.46		

Table (10): The interaction effect between nitrogen and phosphorus fertilization levels on plant height (cm) in 1989 season.

Nitrogen fertilization level	Phosphorus fertilizer level		Mean
	Zero P ₂ O ₅ /fed.	30 kg P ₂ O ₅ /fed.	
30 kg N /fed.	95.90	92.25	94.22
60 kg N /fed	96.75	99.45	98.10
90 kg N /fed.	105.25	103.05	104.15
Mean	99.30	98.35	
L.S.D 0.05	3.27		
0.01	N.S.		

Table (11): The interaction effect between sowing date, nitrogen and phosphorus levels on plant height (cm) 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	53.12	65.37	66.25	63.62	74.12	64.12
April 1 st	58.32	65.22	74.60	74.67	68.02	85.00
April 15 th	79.37	72.55	80.42	82.50	86.42	89.92
May 1 st	87.50	83.50	91.50	87.37	96.37	96.05
May 15 th	74.80	77.67	90.37	97.65	107.75	106.75
L.S.D 0.05	7.39					
0.01	9.78					
1989 season						
March 15 th	75.50	80.00	77.25	76.25	81.00	82.00
April 1 st	88.75	73.50	82.75	84.25	89.50	93.50
April 15 th	95.25	91.75	101.25	112.50	113.00	108.00
May 1 st	111.25	109.25	109.25	116.25	124.50	113.75
May 15 th	108.75	108.25	113.25	108.00	118.25	118.00
L.S.D 0.05	7.72					
0.01	6.68					

Table (12): The interaction effect between sowing date, nitrogen and phosphorus levels on flowering date 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 fertillizer level					
	0 kg /fed.	30 kg /fed.	0 kg /fed.	30 kg /fed.	0 kg /fed.	30 kg /fed.
1988 season						
March 15 th	89.00	89.75	91.00	90.25	92.50	90.75
April 1 st	81.00	80.50	81.50	81.25	82.50	82.00
April 15 th	79.25	79.00	83.50	81.25	84.00	83.25
May 1 st	71.50	71.00	72.00	71.50	75.25	73.50
May 15 th	65.00	64.25	65.50	63.75	68.25	69.00
Mean	77.15	76.90	78.70	77.60	80.50	79.70
L.S.D 0.05	1.35					
0.01	1.78					
1989 season						
March 15 th	91.50	91.50	97.50	92.50	98.75	94.50
April 1 st	85.75	84.50	86.25	85.00	87.00	86.75
May 1 st	77.50	76.25	78.50	77.25	79.00	79.25
May 15 th	76.50	76.50	76.75	78.75	81.00	79.75
Mean	81.00	80.25	83.00	82.15	84.30	82.85
L.S.D 0.05	1.92					
0.01	2.54					

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تأثير ميعاد الزراعة والتسميد الأزوتى والفوسفاتى على نمو 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
 فوسفات/فدان) على بعض صفات النمو لصنف القطن جيزة ٨٠.

وتشير النتائج إلى:

- أدت الزراعة المتأخرة إلى زيادة النسبة المئوية للأنبات وطول النبات وارتفاع أول فرع ثمرى.
- أدت الزراعة المتأخرة إلى نقص معنوى فى عدد الأيام من الزراعة حتى ظهور أول زهرة.
- إزداد طول النبات وعدد الأيام من الزراعة حتى ظهور أول زهرة بزيادة التسميد الأزوتى.
- أدى التسميد الفوسفاتى إلى نقص عدد الأيام من الزراعة حتى ظهور أول زهرة.
- كان للتفاعل بين مواعيد الزراعة ومستويات التسميد الأزوتى تأثيرا معنوياً على طول النبات، ارتفاع أول فرع ثمرى وميعاد ظهور أول زهرة.
- تأثر طول النبات وموعد ظهور أول زهرة معنوياً نتيجة التفاعل بين مواعيد الزراعة والتسميد الفوسفاتى.
- كان للتفاعل بين التسميد الأزوتى والفوسفاتى تأثيرا معنوياً فقط على طول النبات.
- تأثر طول النبات وميعاد ظهور أول زهرة معنوياً نتيجة التفاعل بين ميعاد الزراعة والتسميد الأزوتى والفوسفاتى.