Annals of Agric. Sc., Moshtohor,
Vol. 33(2):455-464, 1995.

EFFECT OF PLANTING DATE, N AND P APPLICATION LEVELS ON SEED INDEX, LINT PERCENTAGE AND TECHNOLOGICAL CHARACTERS 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

The effects of sowing date, N and P fertilization levels on some technological properties of Giza 80 cotton cultivar were studied in 1988 and 1989 seasons at Sids Agricultural Research Station, Beni-Suef Governorate.

The results revealed that lint percentage, seed index and fiber length increased by early sowing, whereas fiber strength and fiber fineness were insignificantly affected by sowing date.

Increasing N levels significantly affected seed index and lint percentage, while fiber length, strength and fineness were not affected by N levels. P fertilization did not affect the studied technological traits. Sowing date X N level had a significant effect on seed index and lint percentage. Also, the second order interaction was significant on seed index in 1989 only. Sowing cotton plants on April 1st with 90 kg N and 30 kg P_2O_5/fed. produced the highest seed index.

INTRODUCTION

Cotton lint is the most important vegetable fiber in the world today and is woven into fabrics, either alone or combined with other fibers. The demand for Egyptian cotton by foreign countries increase due to its excellent qualities which distinguish Egyptian cotton. These qualities in fact are the results of an extremely favourable weather, a highly fertile soil and above all an intimate knowledge of technicians including breeders, spinning technologists and agronomists. Therefore, increasing the quality of cotton fiber is the ultimate goal of any agronomist. This can be achieved by applying some agricultural practices such as sowing date, N and P fertilization. Ewida *et al.*, (1985) and Shalaby *et al.*, (1989) reported that planting date significantly affected seed index and lint percentage.

The effect of N and P levels on the technological traits was reported by Girgis (1972), Salamah (1975), Shafshak *et al.*, (1983), El-Halawany and Azab (1989) and Hosny *et al.*, (1989).

The aim of this work is to study the effect of sowing date, N and p fertilization level on seed index, lint percentage and some technological properties of Giza 80 cotton cultivar in Middle Egypt.

MATERIALS AND METHODS

To achieve the goals of this study, two experiments were conducted during 1988 and 1989 seasons at Sids Agricultural Station, Beni-Suef Governorate. Giza 80 cotton cultivar was used as a plant material of this study. 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 Technological properties and laboratory estimations were recorded in both seasons of study:

1- Lint percentage.
2- Seed index, as a weight of 100 seeds in grams.
3- Staple length, determined as 2.5% span length by the Fibrograph according to the American standardized method (A.S.T.M., D., 1447, 1967).
4- Fiber strength (Pressley Index), which was estimated by using the Pressley tester at zero gauge spacing according to (A.S.T.M. 1449, 1967).
5- Fiber fineness and maturity, using the micronaire apparatus according to the American standardized Method (A.S.E.M., 1448, 1967). Two tests were carried out for each sample and the average was calculated to the nearest 0.1 scale unit.

RESULTS AND DISCUSSION

A- Effect of sowing date:

Results in Table (1) showed that seed index was significantly affected by sowing date in both seasons. In the first season, the highest seed index was obtained from plants sown on March 15th followed by those sown on April, 1st. Whereas, the lowest seed index was obtained from plants sown on may 15th. In 1989 the highest value for this trait was obtained from sowing on April 1st then mid March. These results could be attributed to the longer period to flowering of

early sown plants which in turn increases the amount of metabolites in such plants. Similar results were reported by Karam (1980), Shahine (1986) and Yasseen (1986).

Data in Table (1) indicated that lint percentage was significantly affected by sowing dates in both seasons. Delaying planting dates led to a decrease in lint percentage. In 1988, the four planting dates, i.e., April 1st, April 15th, May 1st and May 15th compared with March 15th revealed a decrease in lint percentage by 0.22, 0.42, 0.82 and 2.62% respectively. Similar trend was noticed in the second season. These results could be ascribed to the relatively lower temperature prevailing during seedling and vegetative stages or prior to floral initiation in case of early sowing which helps the plant to have at their disposal longer period to flowering.

Early sowing caused a considerable increase in staple length in both seasons (Table, 1). The highest staple length was obtained from plants sown at the beginning of April followed by those sown on mid March in 1988 and 1989. Whereas the lowest staple length was obtained from plants sown on May 15th. These results are in agreement with those obtained by Ewida *et al.*, (1985) and Yasseen (1986).

Data presented in Table (1) revealed that fiber strength estimated as pressley index was not significantly affected by sowing dates in both seasons. These results are in agreement with those obtained by Ewida *et al.*, (1985), and Shahine (1986).

The effect of sowing dates on the fiber finess in Micronair units in both seasons was not significant (Table, 1).

B- Effect of nitrogen fertilizer level:

Increasing N level from 30 to 60 and 90 kg N/fed. led to an increase in seed index by 2.35 and 4.10% as compared with 30 kg N/fed. in 1988 and by 3.13 and 5.12% in 1989 (Table 2). These results coincide with those obtained by Girgis (1972), Sawan (1985), and Abdallah (1988).

Data in Table (2) revealed that N application level had a significant effect on lint percentage in both seasons. Increasing N level from 30 to 60 and 90 kg N/fed. decreased lint percentage from 38.09% to 37.82 and 37.79% respectively without significant difference between 60 and 90 kg N/fed. in the first season. Similar trend was obtained in 1989 season where a decrease of 0.08 and 0.41 percentage was observed by raising N level from 30 to 60 and 90 kg N/fed.

These results are in agreement with those obtained by Salamah (1975) and Shafshak *et al.*, (1983).

Table (1): Effect of sowing dates on techonlogical properties of cotton fibers in 1988 and 1989 seasons.

Characters / Sowing date	Seed index (g)	Lint percentage (%)	Staple length S.L. 2.5 (mm.)	Fiber strength pressley index	Fiber fineness (micronaire reading)
1988 season					
March 15 th	10.86	38.72	31.85	9.66	4.50
April 1 st	10.78	38.50	31.94	9.35	4.27
April 15 th	10.59	38.30	31.59	9.55	4.29
May 1st	10.32	37.90	31.21	9.67	4.23
May 15 th	9.68	36.10	30.38	9.57	4.32
L.S.D 0.05	0.19	0.33	0.90	N.S.	N.S.
0.01	0.27	0.46	1.26	N.S.	N.S.
1989 season					
March 15 th	10.37	39.25	32.02	9.65	4.43
April 1 st	10.65	38.75	32.09	9.50	4.22
April 15 th	9.83	38.20	31.64	9.64	4.24
May 1st	9.17	37.51	31.25	9.73	4.21
May 15 th	9.15	35.27	29.96	9.88	4.16
L.S.D 0.05	0.41	0.23	1.65	N.S.	N.S.
0.01	0.58	0.32	N.S.	N.S.	N.S.

Table (2): Effect of nitrgen fertilizer level on technological properties of cotton fibers in 1988 and 1989 seasons.

Characters / Nitrogen fertilizer level	Seed indek (g)	Lint percentage (%)	Staple length (S.L. 2.5%) (mm.)	Fiber strength Pressley Index	Fiber fineness (Micronaire Reading)
1988 season					
30 kg N/fed.	10.23	38.09	31.33	9.58	4.30
60 kg N/ fed.	10.47	37.82	31.48	9.56	4.34
90 kg N/fed.	10.56	37.79	31.39	9.54	4.33
L.S.D. 0.05	0.15	0.20	N.S.	N.S.	N.S.
0.01	0.20	0.26	N.S.	N.S.	N.S.
1989 season					
30 kg N/fed.	9.57	37.96	31.14	9.60	4.27
60 kg N/ fed.	9.87	37.88	31.46	9.67	4.27
90 kg N/fed.	10.06	37.55	31.58	9.65	4.22
L.S.D. 0.05	0.16	0.20	0.43	N.S.	N.S.
0.01	0.21	0.27	N.S.	N.S.	N.S

The effect of N fertilization level on staple length, fiber strength and fineness was not significant in both seasons except staple length in 1989 season (Table. 2). Increasing N level from 30 up to 90 kg N/fed. caused a slight increase in staple length in the second season only. These results are in agreement with those obtained by Girgis (1972). Salamah (1975) and El-Halawany and Azab (1989).

C. Effect of P fertilizer level:

Data in Table (3) indicate that P application did not significantly affect all the studied technological traits except seed index in both seasons. Application of P at a rate of 30 kg P_2O_5/fed. led to an increase in seed index by 1.35 and 1.95% as compared with zero P_2O_5/fed. in both seasons, respectively. Similar results were reported by Kasem *et al.*, (1987) and Hosny *et al.*, (1989).

E- Effect of the interaction:

1- Sowing date X Nitrogen fertilization level:

Results in Tables (4 and 5) indicate that the effect of the interaction between sowing date and N level was significant on seed index in 1989 season, and lint percentage in both seasons.

In 1989 season, the highest seed index (11.0 g) was obtained by sowing cotton plant early at the beginning of April with 90 kg N/fed. Whereas, the lowest seed index (8.77 g) was obtained by delaying sowing to mid May with 30 kg N/fed. (Table. 4).

The highest lint percentage (30.01%) and (39.76%) was obtained from sowing early on mid March with 30 kg/fed. in both seasons. On the other hand, the lowest lint percentage (36.04% and 35.46%) was obtained by delaying sowing date to mid May with the application of 30 kg N/fed. in both seasons.

2- Sowing date X nitrogen level X P level interaction:

Results in Table (6) indicate that seed index was significantly affected by the interaction between sowing date, N and P levels in 1989 season only. The highest seed index (11.35 g) resulted from sowing on April 1st with 90 kg N and 30 kg P_2O_5/fed., whereas the lowest value of this trait (8.72 g) was given from sowing on May 15th with 30 kg N and zero P_2O_5/fed.

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

Character phosphorus fertilizer levels	Seed index (g)	Lint percentage	Staple length S.L. 2.5% (mm)	Fiber strength Pressley Index	Fiber fineness (Micronaire Reading)
1988 season					
Zero P_2O_5/ fed.	10.38	37.93	31.42	9.46	4.33
30 kg P_2O_5/ fed.	10.52	37.88	31.37	9.66	4.31
L.S.D 0.05	0.13	N.S.	N.S.	N.S.	N.S.
0.01	N.S.	N.S.	N.S.	N.S.	N.S.
1989 season					
Zero P_2O_5/ fed.	9.74	37.78	31.38	9.59	4.25
30 kg P_2O_5/ fed.	9.93	37.81	31.40	9.70	4.25
L.S.D 0.05	0.13	N.S.	N.S.	N.S.	N.S.
0.01	0.17	N.S.	N.S.	N.S.	N.S.

Table (4): Effect of the interaction between sowing date and nitrogen fertilizer level on seed index of cotton (g) in 1989 season.

Sowing date	Nitrogen fertilizer level			Mean
	30 kg N/fed	60 kg N/ fe	90 kg N/ fed.	
March 15 th	10.12	10.31	10.69	10.37
April 1 st	10.65	10.29	11.00	10.65
April 15 th	9.42	10.06	10.01	9.83
May 1 st	8.89	9.47	9.15	9.17
May 15 th	8.77	9.23	9.44	9.15
Mean	9.57	9.87	10.06	
L.S.D 0.05	0.35			
0.01	0.46			

Table (5): Effect of the interaction between sowing date and nitrogen fertilizer level on lint percentage 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	39.01	38.82	38.32	38.72
April 1 st	38.97	38.22	38.30	38.50
April 15 th	38.59	38.00	38.30	38.30
May 1 st	37.84	37.96	37.89	37.90
May 15 th	36.04	36.11	36.16	36.10
Mean	38.09	37.82	37.79	
L.S.D 0.05	0.44			
0.01	0.58			
1989 season				
March 15 th	39.76	39.14	38.85	39.25
April 1 st	38.71	38.84	38.70	38.75
April 15 th	38.57	38.09	37.94	38.20
May 1 st	37.27	38.09	37.17	37.51
May 15 th	35.46	35.27	35.09	35.27
Mean	37.96	37.88	37.55	
L.S.D 0.05	0.45			
0.01	0.59			

Table (6): The interaction effect between sowing date, nitrogen and phosphorus levels on seed index 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 /fed	30 kg /fed.	0 kg /fed	30 kg /fed.	0 kg /fed.	30 kg /fed.
1988 season						
March 15 th	9.97	10.27	10.02	10.60	10.65	10.72
April 1 st	10.62	10.67	10.40	10.17	10.65	11.35
April 15 th	9.32	9.52	9.90	10.22	10.07	9.95
May 1 st	8.72	9.05	9.30	9.65	8.97	9.32
May 15 th	8.77	8.77	8.95	9.52	9.77	9.11
L.S.D 0.05	0.50					
0.01	N.S.					

REFERENCES

Abdallah, M.M (1986): Response of cotton to plant population and nitrogen fertilization. Assiut J. of Agric. Sci. 17(2): 243-255.

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.

Ewida, M.A.T.; Fayed, M.H.; Okaz, A.M. and El-Gamal, H.E.A. (1985): Yield components and fiber quality of Egyptian and American cottons with different planting dates. Annals of Agric. Sci. Moshtohor, 23(2):601-611.

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.

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.

Kasem, M.M.; El-Deepah, H.R.. and El-Hosary, A.A. (1987): Effect of fertilization on yield and fiber properties of some cotton cultivars. Annals of Agric. Sci. Moshtohor, 25(2): 645-657.

Salamah, G.G.D. (1975): Effect of weed control and cultural practices on cotton. M.Sc. Thesis, Fac. of Agric. Assiut Univ., Egypt.

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.; 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 in 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 معامل البذرة وتصافى الحليج وبعض الصفات التكنولوجية لتيلة 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 معامل البذرة وتصافى الحليج وبعض الصفات التكنولوجية لتيلة القطن صنف جيزة ٨٠.

وتشير أهم النتائج إلى:

- أدت الزراعة المبكرة إلى زيادة نسبة تصافى الحليج ومعامل البذرة وطول الشعرة، بينما لم يكن لمواعيد الزراعة تأثيرا معنويا على متانة الشعرة ونعومتها.
- تأثر معامل البذرة وتصافى الحليج معنويا بزيادة التسميد الأزوتى بينما لم يكن له تأثيرا معنويا على متانة الشعرة ونعومتها.
- لم يكن للتسميد الفوسفاتى تأثيرا على الصفات التى درست.
- كان للتفاعل بين مواعيد الزراعة والتسميد الأزوتى تأثيرا معنويا على معامل البذرة وتصافى الحليج.
- تأثر معامل البذرة معنويا خلال موسم ١٩٨٩ فقط نتيجة التفاعل بين مواعيد الزراعة والتسميد الأزوتى والفوسفات. وقد أمكن الحصول على أعلى معامل للبذرة وبزراعة القطن أول أبريل مع إضافة ٩٠ كجم ن + ٣٠ كجم فو٢أ٥/فدان.