EFFECT OF SOWING DATE ON YIELD COMPONENTS AND LINT PROPERTIES OF THE COTTON VARIETIES

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ABSTRACT

The four Egyptian cotton varieties; Giza 80, Giza 75, Giza 66 and Dendera and the two Upland cotton varieties, i.e., McNaire 220 and Stoneville 213 were grown on two different sowing dates, i.e., 26th of March and 24th of May in 1981 and 1982 seasons at Giza Experimental and Research Station. Results indicated that seedcotton yield (SCY) and lint yield (LY) were almost increased by early sowing. Early sowing date encouraged production of more boll per square meter (B/m^2), more boll per plant (B/P) and higher lint percent LP. Differences were also evident with respect to fiber properties. Differences were significant for 12.5% SL, mean length, micronaire and yarn strength between the two sowing dates.

Significant genotype x date interaction was encountered as to seed per boll (S/B), (LP), Mean length (ML), 12.5% SL, micronaire and hair weight. Genotypes differed in their stability of performance in that the Egyptian varieties were more stable than their Upland counterparts.

INTRODUCTION

Planting date ranks high among the factors affecting yield and yield components of cotton. In this respect, Shalaby et al. (1977), Shalaby & Saker (1980) and Saker (1983), found that yield, boll weight, lint percent, seed index and lint index were increased by early planting. As for fiber properties, Shalaby & Saker (1980); Hussein et al., (1983) and Saker (1983), reported that fiber fineness, fiber length and yarn strength were increased by early planting. Several researchers. Also, studied the response of various genotypes to planting date. Abo El-Zahab (1969); Amin (1970); Hassan (1976); Kerallah (1979); Yousef (1980), El-Moghazy et al., (1982) and Saker (1983), reported differences in fiber fineness, fiber length and fiber strength among the cultivars they have studied.

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The present study was held to elucidate effects of two planting dates on yield, yield components and various fiber parameters of six cultivars; four representing the Egyptian cotton and two representing the Upland cotton.

MATERIAL AND METHODS

The six cultivars, namely, Giza 80, Giza 66, Dendera, Giza 75, McNaire 220 and Stoneville 213; the first four are Egyptian cotton cultivars and the other two belong to the Upland cotton, were grown on two sowing dates, i.e., 26th of March and 24th of May in 1981 and 1982 seasons, respectively.

The two experiments were undertaken at the Giza Experimental and Research Station. A randomized complete block design with six replications was used. Each plot contained five rows of 4 m. long and 60 cm wide. Seeds were planted in hills 20 cm. apart and thinned to two palnts at six weeks after planting. Normal cultural practices of growing cotton were followed in both seasons. Harvesting was done twice for the inner three middle rows of each plot. 120-individual guarded plants representing each cultivar were taken randomly were used to determine seedcotton yield (SCY) in kentar/fad. and g/plant, boll weight (g/boll), lint percentage (LP) and seed index (SI) (g/100 seed). The following equations were used to calculate other yield components:

(LY)= (SCY)/(LP)
(BP)= (SCY)/(g/boll)
(B/m²)= (SCY/m²)/(g/boll)
(S/B)= (g/boll) (100-LP)/(SI)
(L/S)= (g/boll) (LP)/ S/B

Length parameters (2.5% S.L., 12.5% S.L., ML and HF), and micronaire (Mic), hair weight and yarn strength were determined on lint taken from the boll samples at the Cotton Testing Laboratory at Giza.

Statistical analysis:

Pooled data were subjected to a combined analysis of variance. Means listed in tables are given with respective LSD values calculated at the 5% and 1% levels of probability. Characters showing significant genotype x date interaction effect had their sum of squares partitioned in single degrees of freedom to pinpoint the genotype contributing most to the interaction.

RESULTS

A- Effect of sowing date:

Overall means of agronomic characters and fiber properties of the two sowing dates are presented in Tables 1 and 2. Data show clearly that the early sowing date is better than the late one. In particular, early-sown cotton excelled the late one in number of B/m², number of boll/plant, lint percent, SI and LI (P=0.05). Though differences between the two sowing dates are encountered in SCY/fad., LY, SCY/P and boll weight, yet they are not significant and perhaps were blurred by year x sowing date interaction.

Differences are also clear between the two sowing dates with respect to fiber properties. Clearly, the two sowing dates differed in mean length and micronaire value (P=0.05) and the difference is markedly in yarn strength (P=0.01). Results obtained are in support of those previously reported by Abo El-Zahab (1969), Amin (1970). Hassan (1976); Kerallah (1979); Yousef (1980); El-Moghazy et al., (1982) and Saker (1983).

B- Effect of the genotype:

Data in Tables 3 and 4 show individual variety performances averaged over years and dates of sowing. Evidently, the two Upland varieties surpassed the four Egyptian varieties in the amount of SCY/fad., LY/fad., seedcotton/plant and boll weight. However, the four Egyptian varieties were characterized with higher number of B/m² and higher SI than their Upland counterparts. McNaire 220 showed the highest carrying capacity of bolls/plant among the six tested varieties and Giza 80 excelled other Egyptian varieties in SCY/fad. and LY/fad.

Data on fiber properties in Table 4 show the superimacy of the Egyptian varieties over their Upland counterparts in all length parameters and yarn strength. As for micronaire value and hair weight, it is evident that Upland varieties are coarser than the two Egyptian varieties. In general, varietal performance are much the same as those expected from varietal tests. Exceptional is the hair weight of Giza 80 which is higher than usual (Giza 80 has hair weight of 160-165 x 10^{-8}).

C- Effect of the interaction:

Data in Table (5) show in general that early sowing increased SCY/fad. of all varieties, however, Egyptian varieties responded more favorably than their Upland counterparts.

Table (1): Overall mean performance of yield and yield components of four Egyptian and two Upland cotton genotypes, 1981 and 1982 seasons.

Planting date	SCY	LY	SCY/P	Boll wt.	B/m²	B/P	LP	S/B	SI	LI
	Kentar		g.		no.		%	no	g	
26th March	7.74+	9.25++	19.87	2.78	100.57	7.56	37.36	18.25	9.56	5.70
24th May	6.03	6.94	15.67	2.64	84.57	6.33	36.22	18.71	6.33	5.14
L.S.D. 5%	2.01	2.32	4.75	0.31	13.47	0.88	0.41	0.87	0.24	0.17
L.S.D. 1%	3.06	3.60	7.46	0.48	21.13	1.36	0.74	1.37	0.38	0.27

\+ In metric kentar, one metric kentar= 157.5 kg.
++ In metric kentar, one metric kentar= 50.0 kg.

Table (2): Overall mean performance of fiber properties of four Egyptian and two Upland cotton genotypes 1981 and 1982 seasons.

Planting date	ML	Half-fall	12.5%	2.5%	Micronaire	Haire wt.	Yarn strength
	in		S.L.			g/tex.	Pressely.
26th March	41.97	0.94	0.93	1.05	4.12	185.78	2307.08
24th May	41.33	0.95	0.95	1.06	3.90	178.92	2221.25
L.S.D. 5%	0.44	0.03	0.06	0.22	0.16	0.93	55.51
L.S.D. 1%	0.76	0.09	0.09	0.39	0.25	10.88	87.50

Table (3): Overall mean performance of yield and yield components of four Egyptian and two Upland cotton genotypes 1981 and 1982 seasons.

Character	Genotype G. 80	G. 75	G. 66	Dendera 220	Mcnaire 213		Stoneville L.S.D. 5%	1%
SCY (K/f)+	6.60	4.36	2.57	5.68	10.11	9.02	1.84	2.44
LY (KF)++	8.42	4.75	6.97	6.40	12.38	7.35	2.20	2.94
SCY/P (g)	16.49	13.68	14.85	17.14	22.30	21.20	2.86	3.81
B wt (g)	3.39	2.17	1.95	1.94	3.94	4.04	0.13	0.17
B/m^2	111.48	74.85	101.36	112.70	73.27	83.54	13.21	17.58
B/P	7.90	6.27	7.68	8.89	22.69	5.23	2.86	3.81
L/P	37.97	34.93	36.79	34.45	38.95	38.67	0.55	0.73
S/B	56.97	14.52	11.01	13.39	27.78	27.39	0.81	1.07
SI	9.50	9.68	9.23	9.54	8.72	9.09	0.31	0.42
LI	5.88	5.22	7.74	5.02	5.81	5.51	0.20	0.27

\+ One metric kentar= 157.6 kg seedcotton.
++ one metric kentar= 50 kg. of lint.

Table (4): Overall mean performance of fiber properties of four Egyptian and two Upland cotton genotypes 1981 and 1982 seasons.

Character	G. 80	G. 75	G. 66	Dendera	Mcnaire 220	Stoneville 213	L.S.D. 5%	L.S.D. 1%
12.5% S.L.	1.03	0.94	1.04	0.94	0.84	0.85	0.02	0.03
2.5% S.L.	1.12	1.09	1.13	1.04	0.97	0.98	0.02	0.03
ML. in.	0.94	0.94	0.96	0.94	0.90	0.89	0.05	0.06
Half-fall in.	1.34	1.34	1.33	1.33	1.24	1.25	0.47	0.63
Haire weight (10-8)	183.34	166.96	169.50	160.71	183.92	180.04	0.10	0.39
Mic.	4.32	3.18	4.18	3.82	4.17	4.34	0.16	0.22
Yarn strength	2365.83	2686.75	2283.54	2328.13	1977.09	1943.54	112.25	149.21

Table (5): Mean performance of yield and yield components of four Egyptian and two Upland cotton genotypes grown on 26th March and 24th May in 1981 and 1982 seasons.

Character	Planting date	G. 80	G. 75	G. 66	Dendera	McNaire 220	Stoneville 213	L.S.D 5%	L.S.D 1%
SCY (K/f)+	1/2	7.45 5.75	5.51 3.23	6.68 3.93	7.26 4.48	10.59 9.64	8.92 9.13	1.63	2.23
LY (K/f)++	1/2	9.09 6.74	6.11 3.54	7.55 4.36	8.08 4.72	13.18 11.57	11.51 10.90	1.86	2.57
SCY/P (g.)	1/2	19.66 15.22	15.34 11.82	17.92 11.72	19.27 15.01	24.21 20.38	22.28 29.12	3.86	5.26
Bwt. (g.)	1/2	2.37** 2.03	2.22* 2.10	2.03** 1.87	2.00* 1.87	3.98 3.90	4.10 4.11	[illegible]	0.14
(B/m²)	1/2	117.46 105.50	92.50* 57.49	124.58** 78.11	135.94** 89.47	98.95 93.87	84.01 83.09	10.93	14.90
(B/P)	1/2	8.28 7.52	6.92 5.61	8.94 6.40	9.62 8.16	5.99 5.35	5.58 4.87	0.51	0.71
(LP)	1/2	38.74 37.19	35.21 34.85	35.90 35.47	35.38 33.53	39.55 38.34	39.37 37.96	0.38	0.52
(B/S)	1/2	14.70 13.87	14.37 14.67	13.81 13.33	13.19 13.60	27.80 28.26	26.15 28.62	0.72	0.96
(SI)	1/2	9.91** 9.26	10.01** 9.35	9.41 9.65*	9.80** 9.27	8.92** 8.52	9.28** 8.89	0.19	0.26
(LI)	1/2	6.27** 5.49	5.45** 5.00	5.27** 4.99	5.36** 4.68	5.82 5.32	5.57 5.45	0.15	0.20

\+ Kentar (metric) of seedcotton= 157.5 kg
++ Kentar (metric) of lint cotton= 50.0 kg

Table (6): Mean performance of fiber properties of four Egyptian and two Upland cotton genotypes grown on 26th and 1st May in 1981 and 1982 seasons.

Character	Planting date	Genotype G. 80	G. 75	G. 66	Dendera	Mcnaire 220	Stoneville 213	L.S.D. 5%	L.S.D. 1%
S.L. 12.5%	1	1.03	0.94	1.03	0.94	0.83	0.84		
	2	1.03	0.93	1.04	0.97	0.85	0.85		
								0.01	0.02
2.5% S.L.	1	1.13	1.09	1.11	1.03	0.97	0.98		
	2	1.11	1.09	1.14	1.05	0.98	0.98		
								0.12	0.16
ML	1	0.94	0.93	0.96	0.94	0.92	0.91		
in.	2	0.94	0.95	0.96	0.93	0.89	0.88		
								0.36	0.48
Hair weight	1	187.83	173.08	170.92	166.08	189.42	178.17		
(10^{-8} gr.)	2	178.75	160.84	168.09	155.34	178.42	181.92		
								5.62	7.67
Micronaire	1	4.44	4.43	4.31	3.98	4.30	4.33		
value	2	4.19	4.04	4.06	3.67	4.04	4.36		
								0.13	0.18
Yarn Strength	1	2360.00	2752.50	2353.33	2339.58	2017.09	2020.00		
	2	2371.67	2621.00	2213.75	2316.67	1937.09	1867.08		
								45.03	61.42

In addition, the two Upland varieties did not behave the same in this respect. For example. Mcnaire 220 yielded better in March sowing, but Stoneville 213 yielded better in May sowing. The significant increases in SCY are undoubtdly attributable to the drastic increases in number of B/m^2, which is a mjor component of SCY.

LY/fad. was also increased in March sowing in Egyptian varieties significantly. However, the increases were not significant in case of Upland varieties which retained their better status in LY as a result of their higher lint percentage. The latter was significantly higher in the first sowing date than the late one. SCY/P of March was nonsignificant for Upland varieties.

Components of SCY/P i.e., number of B/P, number of seeds/boll, SI and LI were also increased in March sowing than late sowing of May. And this may account for the increase in SCY/P of the first sowing date.

As for fiber properties, individual varietal performance of March and May sowings are shown in Table 6. Data show that length parameters did not show the same pattern in all varieties. Dendera, for example did better on the 12.5% SL in late sowing. Also, the two Upland varieties gave higher half-fall in the late sowing date. Mcnaire 220 gave coarser fibers in the early planting date, but Stoneville 213 yielded coarser fibers in the late sowing date. Exception from that was fiber fineness. All Egyptian varieties gave heavier hair weight of higher micronaire, which are indicative of the higher maturity on the first sowing date. Again the two Upland varieties did not reflect a general trend on this character. Data also show that yarn strength of all varieties was improved with early planting.

Table (7) show single degrees of freedom of genotype sowing date interaction. Characters menthioned in the table are those showing significant genotype date interaction in the combined ANOVA. Most of the sum of squares of the S/B, M/L and HF are due to the presence of the Upland genotypes. The two Egyptian varieties G. 80 and Dendera are responsible in part of the interaction in LP, ML and HF. As for 12.5% SL, micronaire and hair weight, they seem to have been highly affected by late sowing.

Table (7): Mean squares for single degrees of freedom of genotype x date interaction.

Genotype	S/B	LP	ML	Character Half fall	12.5% S.L.	Micronaire	Hair wt. 10^{-8}g.
G. 80	6.00 ns	8.60*	0.0000	75.00**	0.005**	0.46**	630.74**
G. 75	0.14 ns	4.27 ns	0.0008	0.33	0.005**	0.33**	660.08**
G. 66	4.16 ns	5.18 ns	0.0000	0.33	0.016**	0.52**	14.08 ns
Dendera	0.77 ns	20.11**	0.0066**	0.08	0.028**	0.33**	630.47**
Macnaire 220	62.69**	14.88**	0.0333**	14.08**	0.022**	0.18*	1008.33**
Stoneville 213	17.39**	16.89**	0.0366**	6.75**	0.013**	0.52**	310.04*

** Significant at 1% level of significance.
* Significant at 5% level of significance.
ns nonsignificant

DISCUSSION

Yield of cotton is the result of the interaction of the genetic make-up and environmental factors. Planting date, one of these factors, determines to a large extent the yielding capacity of cotton varieties. Results obtained herein showed that Egyptian varieties of cotton responded favorably to early sowing, i.e., March date and also are in accordance with the findings of many previous investigators. Early sowing has been reported to provide a longer growing season for plants to grow and develop; set more bolls of heavier size, Shalaby et al (1977), Shalaby & Saker (1980) and Saker (1983). Another advantage of early sowing is the enhancement of boll maturation period that favoured the desposition of cellulose in fibers and this accounts for the heavier boll size, heavier lint and seed indices, Christids & Harrison (1955) and Saunt (1973). Better fiber properties were also reported with early sowing. Nakamura and Takashi (1961), reported that wall thickness tended to increase with early planting and this accounts for the higher micronaire and hair weight of fibers in March sowing. Similar results in support of this trend were reported by Waddle and Apleberry (1970); Shalaby & Saker (1980) and Saker (1983). Results on length parameters are also in line with those from previously reported studies, Shalaby & Saker (1980) and Saker (1983). They reported increases in fiber length in early plantings. Yarn strength likewise was also reported to have been increased, Youssef (1980) and Hussein (1983).

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