RESPONSE OF THE EGYPTIAN COTTON CULTIVAR GIZA 83 TO NITROGEN RATES AND TIME OF APPLICATION UNDER DIFFERENT SOWING DATES

ASSY, K.G.[1] AND K.K.I. ABDEL-MALAK[2]

1 Soil and Water Research Institute, Agric. Res. Centre, Giza, Egypt.

2 Cotton Research Institute, Agricultural Research Centre, Giza, Egypt.

(Manuscript received 29 Jauary, 1997)

Abstract

This investigation was carried out at Mallawi Agricultural Research Station, Minia Governorate, during 1994 and 1995 seasons to study the effect of timing and rates of nitrogen application under different sowing dates on the yield and its components of Giza 83 cotton cultivar. Data obtained revealed that early sowing at mid March significantly increased seed cotton yield either per plant or per feddan, lint percentage and seed index, while final plant height and plant stand at harvest were significantly increased in favour of late sowing date at last week of April. Nitrogen application at equal doses before the second and third irrigation significantly increased number of sympodia per plant, open bolls, seed cotton yield per plant and per feddan, while final plant height, boll weight, lint percentage and seed index were slightly affected by application timing. Increasing nitrogen level from 50 to 100 kg N/fed significantly increased final plant height and yield components per plant, while boll weight, lint percentage and seed index were slighty affected. Seed cotton yield/fed was insignificantly increased by increasing nitrogen levels from 75 to 100 kg N/fed.

The interaction of sowing dates and nitrogen levels or the interaction of application timing and nitrogen levels had significant effect on yield components per plant and yield per feddan, while sowing dates and nitrogen application timing interaction did not reach the level of significance.

For early sown plants, at mid March, 75 kg N/fed applied at equal doses before the second and third irrigations produced the higher yield of cotton. For late sown plants at last week of April, 45 kg N/fed applied early in three doses before the first, second and third irrigations produced the highest yield of seed cotton per feddan.

INTRODUCTION

The yield of seed cotton per unit area is governed by many factors. Planting date is cosidered to be one of the most important of these factors. The positive ef-

fects of early sowing on cotton plants growth, yield and its components were reported by many investigators, among them, Shalaby *et al.* (1989), Makram *et al.* (1994) and Ibrahim (1995). Level and time of nitrogen application play an important role on growth and yield of seed cotton. Burhan and Taha (1974) found that application of nitrogen at time of thinning resulted in higher yield than when applied at sowing. Eid (1976) and El-Okkia *et al.* (1980) came to the same conclusion. Hammoud (1984) found that seed cotton yield and boll weight were not affected by time of application. Ghaly and El-Bana (1988) showed that, for Giza 81 cotton cultivar, number of open bolls/plant and seed cotton yield/fed were insignificantly affected by time of N application in four growing seasons. Abou-Zeid *et al.* (1989) observed that applying nitrogen fertilizer in two equal doses before the 2nd irrigation (at thinning time, 30 days from sowing) and 3rd irrigations could be considered the optimal for late sown cotton at the end of April for Giza 80. Gindy *et al.* (1991) found that seed cotton yield was increased by increasing N rate up to 60 kg N/fed in two equal doses before the first and second irrigations compared with zero or 30 kg N applied as one dose before the first irrigation or in three equal doses before the first, second and third irrigations.

Regarding nitrogen fertilizer levels, Ghaly and El-Bana (1988) found that nitrogen levels had no significant effect on plant height and number of plants/fed at harvest, while number of fruiting branches, green bolls/plant and boll weight were increased by increasing nitrogen level from 60 to 90 kg N/fed. Baslious and Abdel-Malak (1992) reported that nitrogen level of 90 90 kg N/fed significantly increased seed cotton yield/fed and its components, while number of plants/fed at harvest was not significantly affected. Makram *et al.* (1994) reported that nitrogen doses had little effects on plant growth, number of open bolls, boll weight, seed cotton yield/plant, lint percentage and seed index, while yield earliness was increased in favour of lower nitrogen doses.

The aim of this investigation was to study the effect of nitrogen application timing and nitrogen levels, under different sowing dates, on yield and its coponents of Giza 83 cotton cultivar.

MATERIALS AND METHODS

This study was carried out at Mallawi Agric. Res. Station during 1994 and 1995 seasons. Cotton cultivar Giza 83 was used. The experimental design was a split-split plots including three sowing dates as main plots, three times of nitrogen

application as sub-plots and three nitrogen levels as sub-sub plots, in four replications.

Sowing dates treatments as main plots were:

1. First sowing date on 18 th and 15th of March in 1994 and 1995 seasons respectively (P_1).
2. Second sowing date on 8th and 6th of April in 1994 and 1995 seasons respectively (P_2).
3. Third sowing date on 28th and 27th of April in 1994 and 1995 seasons respectively (P_3).

Time of nitrogen application treatments as the sub-plots was:

1. Applying 1/3 nitrogen dose at sowing time, 1/3 at first irrigation and 1/3 at second irrigation (T_1).
2. Applying 1/3 nitrogen dose at first irrigation, 1/3 at second irrigation and 1/3 at third irrigation (T_2).
3. Applying one half of nitrogen dose before second irrigation (thinning time) and the rest before third irrigation (T_3).

Nitrogen level treatments as sub-sub plots were:
50 kg N/fed (L_1), 75 kg N/fed (L_2), and 100 kg N/fed (L_3).

The sub-sub plot size was 19.5 m2 including 6 ridges, 65 cm apart and 5 m long. For all experimental plots, the two outer ridges were used as border. Phosphorus fertilizer was added at the rate of 22.5 kg P_2O_5/fed as calcium superphosphate (15.5% P_2O_5) during soil preparation and 24 kg K_2O/fed in the form of potassium sulphate (48% K_2O), in single dose before the second irrigation as a side dress (without blending with nitrogen). Nitrogen fertilizer in the form of ammonium nitrate (33.5% N) was used. Cotton plants were thinned after 36 days from sowing date, leaving 2 plants/hill. The other cultural practices were carried out at proper time and as recommended in cotton production. Some characters of cotton plant growth, yield components per plant, lint percentage and seed index were estimated from ten representative plants in each sub-sub plot, while seed cotton yield/fed and plant stand at harvest were estimated from four ridges from each sub-sub plot.

The meteorological data for the two growing seasons of 1994 and 1995 are presented in Table 1, while the chemical and physical analysis of the experiment soil in 1994 and 1995 seasons are presented in Table 2 .

Statistical analysis was performed according to Snedecor and Cochran (1967). For comparison between means, L.S.D. at 5% level was used.

Table 1. Monthly averages of relative humidity and air temperature in 1994 and 1995 seasons.

Month	Relative humidity		Temperature, C° 1994			1995		
	1994	1995	Min.	Max.	Mean	Min.	Max.	Mean
March	63.3	72.6	8.28	23.83	16.06	9.46	25.46	17.46
April	46.8	56.6	13.04	31.64	22.34	10.54	29.72	20.13
May	44.9	49.3	15.87	34.92	25.40	15.78	33.75	24.77
June	52.0	48.2	18.65	34.44	26.55	20.38	38.73	29.56
July	56.2	59.5	19.75	35.44	27.60	20.90	35.90	28.60
August	64.1	67.0	18.76	34.81	26.79	20.20	35.20	27.70
September	65.8	65.0	18.82	35.18	27.00	18.40	36.00	27.20
October	61.9	68.5	17.52	33.70	25.61	8.00	24.30	16.15
November	71.4	73.3	9.81	34.46	22.14	9.68	23.39	16.54

Source: Mallawi Meteorological Station.

Table 2. Chemical and physical analysis of the soil in 1994 and 1995 season.

Chemical analysis	1994	1995
Available N (ppm)	30.0	28.0
Available P (ppm)	9.0	11.0
Available K (ppm)	300	290
PH (1:2.5)	7.8	8.1

RESULTS AND DISCUSSION

Results recorded in Table 3 show the effect of sowing date, time of nitrogen application and its level on cotton plant growth, yield and its components, lint percentage and seed index in 1994 and 1995 seasons.

A. Effect of sowing date :

Sowing date significantly affected all the studied traits in 1994 and 1995 seasons (Table 3). Plant height significantly increased in favour of late sowing. These results might be due to the increase of air and soil temperature at late sowing (Table 1). Similar results were obtained by Makram *et al.* (1994).

Number of fruiting branches/plant, open bolls/plant and boll weight were significantly increased in favour of early sowing in both seasons (Table 3). Therefore, the yield per plant and yield per feddan were increased in favour of early sowing,i.e. mid March. Seed cotton yield/fed. decreased by 7% and 29% in 1994 season, and 25% and 48% in 1995 season as sowing date was delayed to first and the last week of April, respectively as compared with early sowing at mid March. Increases in yield components and yield/fed in favour of early sowing might be due to relatively long season for early sowing besides, the relatively lower temperature prevailing during seedling and vegetative stages in early sowing (Table 1) which econuraged the cotton plants for more formation of fruiting branches/plant, capable of more load of bolls/plant and heavier boll weight. Similar results were obtained by Shalaby *et al.* (1989), Abdel-Malak and El-Razaz (1991), Makram *et al.* (1994), and Ibrahim (1995).

Plant stand at harvest was significantly increased in favour of late sowing in the two growing seasons. These results might be due to the relatively higher temperature during germination and seedling stages at late sowing (Table 1). These results are in line with those obtained by Abu-Zeid *et al.* (1989), Shalaby *et al.* (1989), Abdel-Malak and El-Razaz (1991) and Ibrahim (1995).

Lint percentage and seed index were significantly increased in favour of early sowing. This might be due to the long period of boll maturation in case of early sowing. Similar results were obtained by Abdel-Malak and El-Razaz (1991) and Makram *et al.* (1994).

B. Effect of time of nitrogen application :

Time of nitrogen application significantly affected all characters under study except final plant height and plant stand/fed. recorded at harvest during 1994 and

1995 seasons (Table 3).

From Table 3 it is obvious that plant height at harvest was insignificantly affected by time of nitrogen application in 1994 and 1995 seasons. However, the tallest plants at harvest were obtained by the application of nitrogen fertilizer at two equal doses, i.e. before the second irrigation (thinning time) and before third irrigation. Ghaly and El-Bana (1988) and El-Gahel *et al.* (1989) obtained similar results.

Number of fruiting branches/plant, open bolls/plant and seed cotton yield per plant and per feddan were significantly affected by time of nitrogen application, while boll weight, lint percentage and seed index were insignificantly affected. However, maximum values of these attributes were obtained from applying nitrogen fertilizer at two equal doses (T_3), while the lowest values were obtained by applying nitrogen fertilizer in three equal doses, i.e. at sowing time, before first irrigation and before second irrigation (T_1). The differences between T_1 and T_2 for seed cotton yield and its components were not significant. These results indicated the positive response of seed cotton yield per unit area and its components per plant by applying nitrogen fertilizer at two equal doses (T_3) than T_1 and T_2. These results might be due to the early application at two equal doses (T_3) than T_1 and T_2. These results might be due to the early application doses of nitrogen fertilizer, (T_1) might be easily leached from the soil by irrigation water before the root system of cotton plant is developed enugh to make full benefit from nitrogen fertilizer. These results are in agreement in one or more trait with those obtained by Burhan and Taha (1974), Eid (1976), El-Okkia *et al.* (1980), Ghaly and El-Bana (1988), Abou-Zeid *et al.* (1989), El-Gahel *et al.* (1989), and Gindy *et al.* (1991).

Plant stand at harvest was not significantly affected by time of nitrogen application. The same results were obtained by Ghaly and El-Bana (1988) and El-Gahel *et al.* (1989).

C. Effect of nitrogen levels :

Rusults in Table 3 show that nitrogen level significantly affected final plant height at harvest, yield and yield components/plant, while boll weight, lint percentage and seed index were slightly affected by nitrogen levels. Plant stand/fed at harvest was insignificantly affected by nitrogen levels.

Final plant height was not significantly increased as nitrogen level was increaed from 50 to 75 kg N/fed while it was significantly increased by increasing nitrogen level from 75 to 100 kg N/fed in both growing seasons. Number of sympodia/

Table 3. Effect of sowing date, level and time of nitrogen application on seed cotton yield and its components of Giza 83 in 1994 and 1995 seasons.

Characters	Season	Planting date			L.S.D.	Time of nitrogen application,			L.S.D.	Nitrogen level			L.S.D.
		First	Second	Third	5%	T_1	T_2	T_3	5%	L_1	L_2	L_3	5%
Plant height at	1994	83.71	94.70	102.86	7.63	94.60	93.26	93.40	N.S.	92.78	92.11	96.37	3.50
harvest (cm)	1995	149.32	152.88	153.66	4.60	150.92	151.80	153.13	N.S.	150.33	150.76	154.76	2.63
No. of sympodia	1994	9.11	8.91	89.18	1.13	8.39	8.75	9.21	0.43	8.43	8.60	9.16	0.41
per plant	1995	10.06	9.10	7.92	0.65	8.68	8.84	9.30	0.44	8.41	8.91	9.38	0.48
No.of open bolls	1994	12.52	11.12	8.73	0.49	9.86	10.50	12.00	0.90	10.29	10.78	11.30	0.93
per plant	1995	11.31	9.89	8.34	0.96	9.57	9.48	10.48	0.81	9.09	9.99	10.45	0.52
Boll weight (gm)	1994	2.03	1.98	1.92	0.02	1.95	1.99	1.99	0.02	1.97	1.99	1.99	NS
	1995	2.01	1.98	1.92	0.03	1.91	1.92	1.98	0.02	1.92	1.94	1.97	0.03
Seed cotton yield	1994	25.45	21.57	16.82	1.64	18.99	20.89	23.96	2.24	20.41	20.91	22.51	1.98
per plant (gm)	1995	22.73	19.56	14.97	1.74	18.16	18.79	20.06	1.60	17.42	19.41	20.43	1.06
Seed cotton yield	1994	8.09	6.71	6.27	0.67	6.86	6.92	7.24	0.35	6.76	7.09	7.18	0.42
per feddan (Kentar)	1995	10.02	8.47	6.74	0.51	8.06	8.41	8.79	0.40	8.25	8.36	8.64	0.35
No. of plants/fed	1994	42538	44907	57561	1596	48031	48462	48569	N.S.	48354	48300	48408	N.S.
at harvest (1000)	1995	48369	52753	57831	0819	52431	53308	53262	N.S.	53169	53260	52523	N.S.
Lint percentage	1994	40.57	39.57	38.38	1.02	39.37	39.51	39.65	N.S.	38.84	3959	4010	1.00
	1995	40.43	39.16	37.84	1.55	39.01	39.09	39.23	N.S.	38.42	39.30	39.62	1.05
Seed index (gm)	1994	9.25	8.53	7.82	0.31	8.36	8.58	8.66	N.S.	8.43	8.49	8.69	N.S.
	1995	8.58	8.10	7.84	0.34	8.09	8.17	8.25	N.S.	8.08	8.14	8.30	N.S.

plant followed the same trend with insignificant differences among 75 and 100 kg N/fed. Similar results were obtained by Ghaly and El-Bana (1988), Baslious and Abdel-Malak (1992) and Makram *et al.* (1994).

Number of open bolls/plant and seed cotton yield/plant significantly increased in favour of higher nitrogen levels but no significant differences were detected between 75 and 100 kg N/fed on bolls number and cotton yield/plant. Boll weight insgnificantly increased in favour of higher nitrogen levels. The lowest values of these attributes were achieved when cotton plants were fertilized by 50 kg N/fed. Seed cotton yield/fed significantly increased by increasing nitrogen doses up to 100 kg N/fed but, the difference between 75 and 100 kg N/fed on seed cotton yield was not significant. These results indicated that moderate nitrogen level, i.e. 75 kg N/fed. to induced the balance between the vegetative growth and fruiting productivity of cotton plants. Besides plant stand at harvest was not affected by nitrogen levels. At the mean time, increases in seed cotton yield/fed which resulted from increasing nitrogen level from 50 to 100 kg N/fed may be due to the increases in yield components per plant besides , low content of available nitrogen in the soil sites (Table 2). These results are in line with those obtained by Ghaly and El-Bana (1988), and Makram *et al.* (1994).

D. Interaction effects:

1- Sowing date x time of nitrogen application:

From Table 4, it is evident that sowing date x time of nitrogen application interaction for the studied traits did not reach the 5% level of significance during the two growing seasons. However, for early sown plants, at mid March, there was a tendency towards increasing number of open bolls/plant and seed cotton yield/plant in one of two seasons and seed cotton yield/fed in the two growing seasons by applying nitrogen fertilizer at equal doses before the second and third irrigations (T_3). For late sown plants at the last week of April, seed cotton yield/fed was increased by applying nitrogen fertilizer in three equal doses, i.e., before the first, second and third irrigations (T_2). These results indicated that late sown plants respond to applying nitrogen fertilizer earlier. These results might be due to the relatively higher temperature prevailing during the early stages in case of late sown plants at last week of April (Table 1) as compared with early sown plants at mid March which were associated with longer vegetative stage.

Table 4. Interaction effect of sowing date and time of nitrogen application on seed cotton yield and its components of Giza 83 in 1994 and 1995 seasons.

Characters	Season	P_1T_1	P_1T_2	P_1T_3	P_2T_1	P_2T_2	P_2T_3	P_3T_1	P_3T_2	P_3T_3	L.S.D. 5%
Plant height at	1994	85.23	82.85	83.04	93.42	94.25	96.42	105.17	102.67	100.75	7.30
harvest (cm)	1995	148.72	149.45	149.78	151.17	152.94	154.54	152.88	153.01	155.08	N.S.
No. of sympodia	1994	8.57	9.21	9.53	8.52	8.84	9.38	8.09	8.19	8.27	N.S.
per plant	1995	9.68	10.19	10.32	8.72	8.77	9.80	7.64	7.55	7.77	N.S.
No.of open bolls	1994	11.25	12.04	14.26	10.13	10.48	12.75	8.20	8.99	8.99	1.55
per plant	1995	10.83	10.99	12.11	9.28	9.71	10.67	8.60	7.74	8.67	1.44
Boll weight (gm)	1994	2.04	2.02	2.04	1.96	1.99	1.99	1.85	1.95	1.95	N.S.
	1995	2.01	1.99	2.03	1.94	1.98	2.01	1.78	1.79	1.90	N.S.
Seed cotton yield	1994	23.00	24.34	29.00	18.48	20.86	25.38	15.49	17.48	17.49	4.22
per plant (gm)	1995	21.84	21.79	24.57	17.98	19.26	21.43	14.65	13.83	16.42	2.76
Seed cotton yield	1994	8.00	7.62	8.62	6.48	6.74	6.89	6.12	6.42	6.24	0.72
per feddan (Kentar)	1995	9.23	9.90	10.96	8.38	8.44	8.62	6.56	6.88	6.80	0.60
No. of plants/fed	1994	43023	42054	42538	44154	45930	44638	56915	57292	58530	N.S.
at harvest (1000)	1995	47908	48692	48462	52385	52846	52892	57046	58292	58154	N.S.
Lint percentage	1994	40.38	40.57	40.76	39.43	39.59	39.71	38.29	38.37	38.49	N.S.
	1995	40.11	40.31	40.59	39.12	39.15	39.19	37.81	37.82	37.90	N.S.
Seed index (gm)	1994	9.13	9.30	9.33	8.33	8.60	8.67	7.67	7.83	7.97	N.S.
	1995	8.53	8.57	8.63	8.00	8.10	8.20	7.77	7.83	7.93	N.S.

2- Sowing date x nitrogen level :

From Table 5, it is clear that sowing date x nitrogen level interaction significantly affected cotton yield per plant and yield per feddan except plant stand at harvest, lint percentage and seed index, in both seasons. Higher nitrogen levels of 75 or 100 kg N/fed increased seed cotton yield and yield components per plant for early sowing date, i.e. at mid March, but the differences between 75 and 100 kg N/fed on seed cotton yield were not significant at early sowing dates. At the mean time, yield/fed and its components per plant at late sowing, i.e. last week of April, were not significantly affected by nitrogen levels. These results indicated that early sown plants were more responding to higher nitrogen levels to adequate plant growth and the productive capacity due to longer growing season. The reverse was true with regard to lower nitrogen levels for late sown plants which were associated with shorter vegetative growth period. Therefore, 75 kg N/fed at early sown plants, i.e. mid March and 50 kg N/fed at late sown plants, i.e. at last week of April produced the highest yield of cotton for each planting date under the conditions of Mallawi Agric. Res. Station. These results are in line with those obtained by Makram *et al.* (1994).

3- Time of nitrogen application x nitrogen level :

From Table 6, it is obvious that time of nitrogen application x nitrogen level interaction significantly affected number of sympodia/plant, open bolls/plant and seed cotton yield per plant and per feddan, while the other traits under study were not significantly affected. The higher values in this respect were produced from higher nitrogen level at equal doses before the second and third irrigations (T_3). The reverse was true with regard to lower nitrogen level and time of nitrogen application of T_1 or T_2. Ghaly and El-Bana (1988) found that interaction between years x nitrogen levels, between years x time of nitrogen application and between years x nitrogen levels x time of nitrogen application on seed cotton yield were not significant.

4- Sowing date x time of nitrogen application x nitrogen level:

Sowing date x time of nitrogen application x nitrogen level interaction significantly affected seed cotton yield/fed in 1994 and 1995 seasons (Tables 7 and 8), while the other traits under study did not reach the 5% level of significance. Higher seed cotton yield/fed was produced from early sown plants, at mid March, fertilized by 75 or 100 kg N/fed and applied at equal doses before the second and third

Table 5. Interaction effect of sowing date and nitrogen level on seed cotton yield and its components of Giza 83 in 1994 and 1995 seasons.

Characters:	Season	P_1L_1	P_1L_2	P_1L_3	P_2L_1	P_2L_2	P_2L_3	P_3L_1	P_3L_2	P_3L_3	L.S.D. 5%
Plant height at	1994	82.67	83.84	84.62	94.08	91.25	98.75	101.58	101.25	105.75	6.07
harvest (cm)	1995	147.44	148.29	152.22	151.34	151.31	156.00	152.22	152.69	156.07	4.56
No. of sympodia	1994	8.82	8.93	9.57	8.67	8.40	9.67	7.81	8.48	8.25	0.71
per plant	1995	9.46	10.05	10.68	8.35	9.06	9.54	7.41	7.63	7.92	0.82
No.of open bolls	1994	11.77	12.35	13.44	10.30	11.24	11.82	8.81	8.75	8.63	1.61
per plant	1995	10.13	11.74	12.05	9.18	9.88	10.60	7.96	8.36	8.69	0.90
Boll weight (gm)	1994	2.02	2.04	2.04	1.97	1.98	1.99	1.91	1.89	1.93	0.03
	1995	1.98	2.02	2.04	1.95	1.97	2.01	1.80	1.82	1.85	0.04
Seed cotton yield	1994	23.74	25.22	27.39	20.30	20.95	23.46	17.20	16.57	16.69	3.43
per plant (gm)	1995	20.07	23.58	24.55	17.85	19.48	21.34	14.33	15.18	15.39	1.84
Seed cotton yield	1994	7.38	8.15	8.70	6.45	7.09	6.56	6.48	6.04	6.27	0.72
per feddan (Kentar)	1995	9.88	9.90	10.32	8.15	8.50	8.79	6.77	6.68	6.80	0.60
No. of plants/fed	1994	43238	42430	42000	44315	45446	44961	57508	56969	58154	N.S.
at harvest (1000)	1995	48831	48600	47723	52846	52938	52523	57831	58338	57369	N.S.
Lint percentage	1994	39.98	40.523	41.22	38.47	40.00	40.25	38.08	38.25	38.82	N.S.
	1995	39.59	40.66	40.77	38.39	39.20	39.88	37.28	38.04	38.22	N.S.
Seed index (gm)	1994	9.17	9.23	9.37	8.40	8.47	8.73	7.73	7.77	7.97	N.S.
	1995	8.43	8.50	8.80	8.00	8.10	8.20	7.80	7.83	7.90	N.S.

Table 6. Interaction effect of nitrogen level and time of application on seed cotton yield and its components of Giza 83 in 1994 and 1995 seasons.

Characters	Season	T_1L_1	T_1L_2	T_1L_3	T_2L_1	T_2L_2	T_2L_3	T_3L_1	T_3L_2	T_3L_3	L.S.D. 5%
Plant height at	1994	92.47	93.20	98.15	92.93	91.83	95.00	92.93	91.31	95.97	N.S.
harvest (cm)	1995	148.09	151.95	152.73	150.20	150.27	156.19	152.72	151.31	155.38	N.S.
No. of sympodia	1994	8.23	8.12	8.83	8.51	8.51	9.23	8.56	9.18	9.44	0.71
per plant	1995	8.29	8.69	9.05	8.39	8.65	9.48	8.54	9.40	9.94	0.82
No.of open bolls	1994	9.17	10.04	10.37	10.04	10.34	11.14	11.67	11.97	12.37	1.61
per plant	1995	8.63	9.94	10.14	9.09	9.44	9.91	9.56	10.60	11.29	0.90
Boll weight (gm)	1994	1.93	1.94	1.98	2.00	1.98	2.01	2.00	1.99	1.98	N.S.
	1995	1.87	1.90	1.95	1.96	1.93	1.94	1.96	1.98	2.00	N.S.
Seed cotton yield	1994	18.10	18.31	20.55	19.79	20.53	22.37	23.35	23.90	24.61	3.43
per plant (gm)	1995	16.26	18.99	19.21	17.26	18.23	19.40	18.73	21.02	22.67	1.94
Seed cotton yield	1994	6.69	6.65	7.26	6.59	7.12	7.06	7.00	7.50	7.21	0.72
per feddan (Kentar)	1995	7.85	8.09	8.25	8.38	8.26	8.59	8.56	8.73	9.09	0.60
No. of plants/fed	1994	47869	47923	48192	49000	48246	48085	48138	48677	48892	N.S.
at harvest (1000)	1995	52800	52846	51692	53400	53908	52615	53308	53077	53308	N.S.
Lint percentage	1994	38.67	39.43	40.11	38.79	39.64	40.11	39.07	39.70	40.19	N.S.
	1995	38.35	39.17	39.60	38.41	39.27	39.60	38.49	3939.45	39.74	N.S.
Seed index (gm)	1994	8.27	8.33	8.70	8.50	8.53	8.70	8.53	8.60	8.83	N.S.
	1995	8.00	8.07	8.27	8.10	8.13	9.27	8.13	8.27	8.40	N.S.

Table 7. Interaction effect of sowing date, level and time of nitrogen application on seed cotton yield/fed in 1994 season.

Time of nitrogen application	First sowing date, (P_1)			Second sowing date, (P_2)			Third sowing date, (P_3)		
	Nitrogen level, kg/fed.			Nitrogen level, kg/fed.			Nitrogen level, kg/fed.		
	50	75	100	50	75	100	50	75	100
T_1	7.47	7.41	9.08	6.30	6.68	6.45	6.30	5.86	6.24
T_2	6.53	7.85	8.50	6.45	7.27	6.53	6.83	6.24	6.15
T_3	8.14	9.17	8.50	6.59	7.33	6.73	6.30	6.01	6.39

L.S.D. 5% = 1.33

Table 8. Interaction effect of sowing date, level and time of nitrogen application on seed cotton yield/fed in 1994 season.

Time of nitrogen application	First sowing date, (P_1)			Second sowing date, (P_2)			Third sowing date, (P_3)		
	Nitrogen level, kg/fed.			Nitrogen level, kg/fed.			Nitrogen level, kg/fed.		
	50	75	100	50	75	100	50	75	100
T_1	9.03	9.23	9.44	8.06	8.44	8.64	6.45	6.59	6.68
T_2	9.96	9.49	10.25	8.15	8.41	8.73	7.03	6.86	6.74
T_3	10.64	10.99	11.28	8.21	8.64	9.03	6.83	6.56	6.97

L.S.D. 5% = 1.10

irrigations. The reverse was true with regard to late sown plants at last week of April and fertilized by 75 kg N/fed splitted in three equal doses at sowing time, first and second irrigations (T_1). On the other hand, the higher yield/fed for late sown plants at last week of April was produced from fertilizer level of 50 kg N/fed applied in three equal doses at the first, second and third irrigations (T_2).

CONCLUSION

From the previous results it is clear that :

1- It is important to sow cotton plants early as soon as climatic conditions are favourable in order to produce the highest yield of seed cotton per feddan.

2- For early sown plants at mid March, 75 kg N/fed applied at equal doses before the second and third irrigations are suitable to produce the highest seed cotton yield/fed.

3- For late sown plants, at last week of April, lower nitrogen levels, 50 kg N/fed applied early in three doses before the first, second and third irrigations, are appropriate to produce the highest yield of seed cotton.

REFERENCES

1 . Abdel-Malak, K.K.I., and M.M. El-Razaz. 1991. Response of Giza 83 cotton cultivar to some cultural practices. Minia J. Agric. Res. and Dev. 13 (3) : 1129-1144 .

2 . Abou-Zeid, H.M., K.K.I. Abdel-Malak, A.E. Abdel-Kader and M.M. El-Razaz. 1989. Optimum time of thinning and nitrogen application in late sown cotton. Annals Agric. Sci., Fac. Agric., Ain Shams Univ. 43 (2) : 837-844 .

3 . Baslious, S.I. and K.K.I. Abdel-Malak. 1992. Effect of irrigation intervals, nitrogen levels and their interaction on seed cotton yield of Giza 83 and its components. Minia J. Agric. Res. and Dev. 14 (3) : 699-713.

4 . Burhan, H.D. and M.A. Taha. 1974. Effect on new cotton varieties of sowing date, plant population at time of fertilizer application. Cotton Grow. Rev. 51 : 177-186.

5 . Eid, E.T.A. 1976. "The Interrelationships Between Some Cotton Productive Characters and Plant Contents Under Certain Cultural Treatments" Ph.D. Thesis, Fac. Agric., Cairo Univ., Egypt. PP. 205-212.

6 . El-Gahel, S.M.F., M.M. El-Razaz and A.M. El-Shinnawy. 1989. Effect of dates and levels of N application at late sowing of cotton. Minufiya J. Agric. Res. 14 (2) : 875-884.

7 . El-Okkia, A.F.H., M.H. El-Akkad, H.R. El-Hanafi and M.A. El-Dayem 1980. Effect of nitrogen fertilizer levels and its split application on yield and earliness in Giza 69 cotton variety. Agric. Res. Rev. 58 (9) : 113-130 .

8. Ghaly, F.M. and M.H. El-Bana. 1988. Effect of level and time of nitrogen application on growth and yield of Egyptian cotton. Proc. 3rd Egyptian Conf. Agron., 5-7 Sept. Kafr El-Sheikh, Egypt, 11: 55-64.

9. Gindy, E.N., M.A. Abdel-Reheem and F.G. Younis. 1991. Effect of rate and time of nitrogen application on yield and some constituents of Dandara cotton variety. Egypt. J. Agric. Res. 69 (2) : 369-378 .

10. Hammoud, M.M.E. 1984. "Effect of Planting Date, Nitrogen Rate and its Time of Application on yield and Earliness of Egyptian Cotton". Ph.D. Thesis, Fac. Agric., Al-Azhar Univ., Egypt. pp. 65-66.

11. Ibrahim, M.K.M. 1995. "Effect of the First Post Planting Irrigation Timing and When to Stop Watering on Cotton Production". Ph.D. Thesis, Fac. Agric. El-Mainia Univ.

12. Makram, E.A., H.A. Abd El-Aal, K.A. Ziadah and A.A. Darwish. 1994. The inter-relationship between planting date and each of hill spacing and nitrogen fertilization doses for the Egyptian cotton cultivar Giza 75. Annals Agric. Sci. Ain Shams Univ., Cairo 39 (2) : 609-622.

13. Shalaby, A.M. A.M. Eissa, F.H. Abdel and K.K.I. Abdel-Malak. 1989. Effect of planting systems, planting dates and distance between hills on yield and components of Egyptian cotton. Assiut Journal of Agricultural Sciences 20 (2) : 279-290.

15. Snedecor, D.M. and W.G. Cochran. 1967. "Statistical Methods", 6th Edition, Iowa State Univ. Press, Ames, Iowa, U.S.A.

استجابة صنف القطن المصرى جيزه ٨٣ لمعدلات السماد الازوتى ومواعيد الإضافة فى مواعيد الزراعة المختلفة

كامل جبر عاصى١ ، كرم كامل اسرائيل عبد الملاك٢

١ معهد بحوث الأراضى والمياه ، مركز البحوث الزراعية ، الجيزة – مصر .
٢ معهد بحوث القطن مركز البحوث الزراعية – الجيزة .

أجرى هذا البحث بمحطة البحوث الزراعية بملوى – محافظة المنيا خلال موسمى ١٩٩٤، ١٩٩٥ لدراسة تأثير ميعاد اضافة معدلات التسميد الازوتى فى مواعيد الزراعة وكذلك التفاعل بينهما على محصول القطن جيزه ٨٣، وكان التصميم الاحصائى المستخدم قطع منشقة مرتين فى أربع مكررات حيث كانت مواعيد الزراعة فى القطع الرئيسية، ميعاد اضافة السماد الازوتى فى القطع الشقية الأولى بينما كانت معدلات التسميد الازوتى فى القطع الشقية الثانية.

وكانت أهم النتائج المتحصل عليها :

١ – أدت زراعة القطن فى منتصف شهر مارس الى يادة معنوية لمكونات المحصول للنبات ومحصول القطن الزهر للفدان وتصافى الحليج ومعامل البذرة بينما أدت الزراعة المتأخرة فى الأسبوع الاخير من ابريل إلى زيادة معنوية لطول النبات فى نهاية الموسم وعدد النباتات للفدان فى نهاية الموسم.

٢ – أدى اضافة السماد الازوتى على دفعتين متساويتين قبل الرية الثانية والثالثة الى زيادة معنوية لعدد الأفرع الثمرية للنبات وعدد اللوز المتفتح للنبات ومحصول النبات الفردى وكذلك محصول القطن الزهر للفدان بينما كان لمواعيد اضافة السماد الازوتى تأثير طفيف على طول النبات ووزن اللوزة وتصافى الحليج ومعامل البذرة.

٣ – أدت زيادة معدلات التسميد الازوتى من ٥٠ كجم الى ١٠٠ كجم للفدان الى زيادة معنوية لطول النبات ومكونات المحصول للنبات الواحد بينما كان لمعدلات التسميد الازوتى تأثيرا طفيفا على وزن اللوزة – تصافى الحليج ومعامل البذرة – وأدت زيادة التسميد الازوتى من ٧٥ الى ١٠٠ كجم للفدان الى زيادة غير معنوية لمحصول القطن الزهر للفدان بينما لم يكن لمعدلات التسميد الازوتى تأثيرا معنويا على عدد النباتات فى نهاية الموسم.

٤ – كان للتفاعل بين مواعيد الزراعة ومعدلات التسميد الازوتى وكذلك بين مواعيد اضافة السماد الازوتى ومعدلات التسميد الازوتى تأثيراً معنويا على مكونات محصول النبات الواحد ومحصول القطن الزهر للفدان بينما لم يصل التفاعل بين مواعيد الزراعة وميعاد اضافة السماد الازوتى الى حدود المعنوية.

ومن هذه الدراسة يتضح أهمية الزراعة المبكرة للقطن للحصول على أعلى محصول من القطن الزهر بالتسميد الازوتى معدل ٧٥كجم/فدان على دفعتين متساويتين قبل الرية الثانية والثالثة، بينما للزراعة المتأخرة فى آخر شهر ابريل يمكن الحصول على أعلى محصول من القطن الزهر بالتسميد الازوتى بمعدل ٥٠ كجم للفدان مع التكبير فى اضافة السماد الازوتى على ثلاث دفعات متساوية قبل الرية الاولى والثانية والثالثة.