YIELD AND FIBER PROPERTIETS OF COTTON VAR. GIZA 75 AS AFFECTED BY PLANT POPULATION

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ABSTRACT

Two field experiments were carried out during 1984 and 1985 seasons at the Research and Experimental Station at Moshtohor. The aim of this study was to investigate effects of spacing between hills, and number of plant/hill on yield, yield components and fiber properties of cotton.

Each experiment included 18 treatments which were the combination of six spacings and three treatments as to number of plants/hill. Results could be summarized as follows:

1- Increasing number of plants/hill signifiantly increased seedcotton yield/fad. Nevertheless, seedcotton yield/plant, weight of boll and number of bolls/plant significantly decreased with increasing number of plants/hill.

2- Yield, major components, namely, boll weight, number of bolls/plant and seedcotton yield plant were greatly affected by distance between hills and were positively correlated with wider spacing. The highest yield of seedcotton/fad. was obtained when hills were spaced 30 cm apart on the ridge. Thereform, with Giza 75 variety, hills spaced 30 cm appeared to be the most recommendable.

3- The effect of the interaction of hill spacing and number of plants/hill was significantly on seedcotton yield/fad., seedcotton yield/plant, boll weight and number of bolls/plant.

INTRODUCTION

Yielding capacity of any cotton variety is determined by and large by its genetic make-up. Yet, the latter by itself will not develop a good yield unless certain environmental conditions are met. Of these, hill spacing and number of left-in plants per hill at thinning time determine to

great extent the yielding capacity of a genotype. And because of the rapid run-out of cotton varieties and the appearance of new ones to replace them, the optimal cultural practices are not known.

The reduction in number of plants per hill was studied in several cotton varieties, but not in Giza 75, and this reduction was reported to increase the number of bolls/plant El-Hattab and Abd El-Raheem (1962), Hussein et al. (1970), El-Hattab et al. (1976) and Bisher (1958), has previously reported that three plants/hill produced more seedcotton than two plants per hill and the latter outyielded one plant per hill. Lint percentage was not affected by the number of left-in plants/hill (Hussein et al., 1970; El-Hattab et al., 1976 and Hefni et al., 1978).

Results of researchers on the optimal spacing between hills were variable. Bisher (1958), Abo-Ellail and Lachin (1965) and El-Hattab and Abd El-Raheem (1965), found insignificant increases in yield as spacings between hills decreased. In contrast, El-Hattab et al., (1976) and Hussein et al. (1970), reported significant differences in seedcotton yield due to varied hill spacings. Varietal differential response to hill spacings and number of plants left in per hill at thinning, thus justifies the conduction of this piece of research.

MATERIAL AND METHODS

The field experiments were carried out at the Research and Experimental Center of the Faculty of Agriculture at Moshtohor, Kalubia Governorate during the 1984 and 1985 seasons. The long staple variety Giza 75 recommended for the area was used as the experimental material in the study. Each experiment was laid out in a split-plot design with four replication. Eighteen treatments were tested. These were the combinations of six spacings and three population densities (viz. number of plants/hill). The tested spacings were: 10, 20, 30, 40, 50 and 60 cm. Densities were: one, two, three plants/hill. Spacings were assigned to the main plots, whilst the number of plant per hill were alloted to sub-plots. The sub-plot area was 10.5 m^2. (3x3.5 m.). Planting was done on the 23th of March. All experimental units were fertilized with urea (46% N) other cultural practices followed were those recommended for the area.

At harvest ten plants, randomly withdrawn from each subplot, were used to determine yield components and technological properties. Seedcotton yield and the number of

bolls were determined on plot basis. Data collected included the followings:

1- Seedcotton yield/fad. in kg.
2- Seedcotton yield/plant in g.
3- Boll weight (g.).
4- Number of bolls/plant.
5- Openning percentage.
6- Lint percentage.
7- Staple length paramaters estimated as 2.5%, 50% and 66.7% span lengths.
8- Uniformity ratio (UR).

Statistical analysis:

A combined analysis on pooled data was carried out. Afterwards, means were compared by Duncan's Multiple Range Test (DMR).

RESULTS AND DISCUSSION

A- Seasonal effects:

Results in Tables (1 and 2) showed that seasonal variations are existent for yield and yield components and fiber strength. Nevertheless, high mean values for seedcotton and number of open bolls/plant occurred in the second season. The remainder of characters had their high mean values occurring in the first season. On the contrary, variations are non-significant for technological characters which, in fact, are more or less stable over environmental conditions.

Table (1): Effect of season on yield and yield components of cotton.

Year	No. of bolls/plant	Openning %	Boll weight (g)	Seedcotton yield/plant (g)	Seedcotton yield/fad.	
					kg.	Rel.
1984	18.98 a	67.92 b	3.10 a	39.75 b	1046 b	100
1985	19.08 a	76.94 a	2.90 b	44.53 a	1394 a	133

Means within a column not followed by the same letter are significantly different at the 5% level of probability.

Table (2): Effect of season on fiber properties of cotton.

Year	Lint %	2.5% S.L.	50% S.L.	66.7% S.L.	UR.	Micron-aire	Pressley value
1984	37.34a	1.18a	0.610a	0.473a	51.74a	4.80a	9.54a
1985	38.31a	1.12a	0.585a	0.456a	52.30a	4.65a	9.10b

Means within a column not followed by the same letter are significantly different at the 5% level of probability.

B- Effect of spacing between hills:

The effect of spacing on yield, yield major components and technological properties as averages of the two seasons are shown in Table (3 and 4). From the results it is apparent that the distance between hills had significant effects on yield and its major components. To illustrate, the highest yield of seecotton/fad. was obtained when hills were spaced 30 cm apart on the ridge. On the other hand, with wider spacings seedcotton yield decreased. Therefrom, with Giza 75 variety, hills spaced 30 cm appeared to be the most recommendable. Adversely, seedcotton yield and number of bolls per plant were increased by wider spacing. Yield difference of various hill spacings could be either due to more plants in plots of narrow spacings or to more seed-cotton yield/plant in plots of wider spacings. The latter, however run short to make up for lack of stand in plots where hills were set up at distances further than 30 cm apart. Similar results were reported by Bisher (1958), Abo Ellail and Lachin (1965), El-Hattab and Abd El-Raheem (1965), who reported significant increases in seedcotton as hill spacings decreased. However, Hussein et al. (1970) and El-Hattab et al. (1976), reported the otherwise. Hefni et al. (1978), reported year to year variation. Also, there was a consensus by the above researches that hill spacing had little effect, if any, on boll weight, lint percent and fiber tenological properties with the exception of Sourour (1958), who reported that staple length increased by wider spacing and decreased by increasing the number of plants/hill.

C- Effect of the number of plants per hill:

The effect of number of plants/hill on seedcotton yield, yield major components and technological properties are presented as pooled averages over hill spacings in Tables (5 and 6). Evidently, the number of palnts per hill had a significant effect on seecotton yield/fad. and seed-cotton/plant and their major components listed therein.

Table (3): Effect of spacing between hills on yield and yield components of cotton (combined analysis of 1984 and 1985 seasons).

Hill spacing (cm)	No. bolls/ plant	Openning %	Boll weight (g)	Seedcotton yield/plant (g)	Seedcotton yield/fad.	
					Kg	Rel.
10	12.80c	72.34b	2.68c	23.84d	1232b	100
20	16.02b	67.48c	3.09a	33.72c	1232b	100
30	16.85b	71.63b	2.92b	33.67c	1420a	115
40	22.15a	71.02b	3.11a	50.20b	1202b	98
50	22.54a	75.20a	3.08a	54.01a	1171bc	95
60	23.55a	75.20a	3.09a	57.32a	1061c	86

Means within a column not followed by the same letter are significantly different at the 5% level of probability.

Table (4): Effect of spacing between hills on fiber properties of cotton (combined analysis of 1984 and 1985 seasons).

Hill spacing	Lint %	2.5% S.L	50% S.L	66.7% S.L	UR.	Micro-naire	Pressely value
10	37.80a	1.145a	0.594a	0.461a	51.83a	4.70a	9.33a
20	37.95a	1.136a	0.589a	0.457a	52.57a	4.71a	9.34a
30	37.86a	1.158a	0.611a	0.471a	52.29a	4.86a	9.40a
40	37.91a	1.166a	0.606a	0.477a	51.97a	4.76a	9.49a
50	37.47a	1.163a	0.604a	0.469a	51.90a	4.71a	0.29a
60	37.95a	1.26a	0.581a	0.454a	51.56a	4.61a	9.08a

Means within a column not followed by the same letter are significantly different at the 5% level of probability.

Although, on per fadan basis seedcotton and number of open bolls increased with increasing the number of left in plants, the per plant seedcotton and boll weight decreased just about linearly.

Technological properties did not seem to be influnced by the number of plants/hill and means are about the same. El-Hattab and Abd El-Raheem (1965); Shalaby (1967); El-Bayoumy, (1971) and Hefni and Salem (1977) reported the same trend with other cotton varieties. However, Hefni and Salem (1977), reported significant difference in boll weight due to varied number of plants/hill.

Table (5): Effect of number of plants/hill on yield and yield components of cotton (combined analysis of 1984 and 1985 seasons).

No. of plants/ hill	No. of bolls/plant	Openning %	Boll weight (g)	Seedcotton yield/plant (g)	seedcotton yield/fad.	
					kg	Rel.
One	24.14a	74.40a	3.19a	59.19a	1020c	100
Two	18.45b	73.33a	2.97b	39.19b	1380a	135
Three	14.36c	68.04b	2.83c	27.25c	1259b	123

Means within a column not followed by the same letter are significantly different at the 5% level of probability.

D- The effect of spacing and plant/hill interaction:

The effect of the interaction of hill spacing and number of plants/hill was significant only on seedcotton yield and number of bolls/plant and boll weight. From figure (1), it is apparent that two plants/hill were better in narrow spacings (10-20 cm.). But, 3 plants were better with wider spacings (50-60 cm.). The optimal seedcotton yield was obtained with 2 plants/hill spaced 30 cm. apart. As to seedcotton/plant, it apparently follows the adverse manner of in that higher yields/plant were obtained by wider spacing irrespective of the number of plants/hill. And the top yield was obtained with 50 and 60 cm. spacings and a single plant/hill. Weight per boll(g). approximates the same trend of seedcotton/plant up to 40 cm. with no subtle difference between two and three plants/hill at the widest spacings (50 and 60 cm.). This, together with the clumping of curves indicate a limit to increasing boll weight by environmental alteration. The number of open bolls/plant follows by and large the same trend taken by yield/plant reflecting the importance of the number of

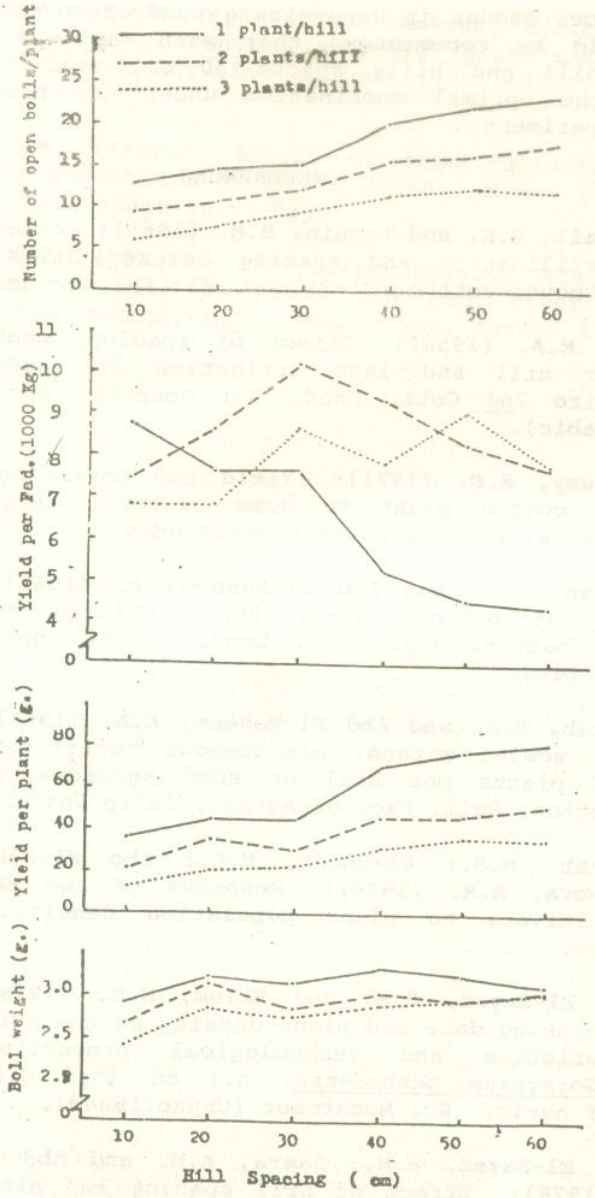

Fig. (1) : Effect of the interaction of hill spacing x number of left -in plants / hill.

plants per faddan in determining seedcotton yield. Finally, it could be recommended that with Giza 75 variety, two plants/hill and hills spaced 30 cm. apart on ridges is about the optimal combination under the circumstances of this experiment.

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