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EFFECT OF HILL SPACING AND REMOVAL OF TERMINAL BUD (TOPPING), TERMINAL SQUARE OF SYMPODIA (PRUNING) OR BOTH AT DIFFERENT PLANT HEIGHT OF GIZA 89 COTTON CULTIVAR

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Abstract

Two field experiments were carried out at Sakha Agricultural Research Station during 1996 and 1997 seasons on the new cotton cultivar Giza 89, to study the effect of hill spacing of 20,25 and 30cm (plant population) and plant growth alteration treatments i.e. topping , side branch bruning at 120 cm height, topping + pruning at 100cm height + pruning at 120 cm height on some vegetative and fruiting habits, earliness and seed cotton yield and its components.

Generally the combined data clarified that wider hill spacing increased number of monopodia, main strem internodes, sympodia, additional fruiting branch bolls, retended bolls. fruiting sites, percentage of bolls on vegetative branches open bolls, boll weight and seed cotton-yield (Kintar/ fed.) . while it decreased final plant height, number of aborted sites , days to finalt open boll, earliness percentage and number of unopen bolls. However , plant alteration treatments had a positive effect on most studied traits and reverselly depressed number of monopodia, aborted sites and earliness percentage comparing with check. Within plant altering treatments, there are significant divergences. The results indicated that topping plants at 120cm height increased number of retended bolls, fruiting sites , days to first open-boll, open boll, unopen bolls and seed cotton yield (Kintar/fed.). Side branch pruning at 120 cm height increased final plant height, monopodia, main stem internodes, sympodia, earliness percentage and boll weight. Topping + pruning at 100cm height only decreased number of aborted sites. Topping + pruning at 120cm height increased additional fruiting branch bolls, percentage of bolls on vagetative branches, boll weight and seed cotton yield (Kintar/fed.)

Topping at 120 cm height and 30cm hill spacing which resulted in highest number of retended bolls and seed cotton yield.

INTRODUCTION

For a given cotton plant or genotype, lodging is Known to vary according to nature of varietal growth, nutritional and environmental conditions. In this respect,

removing the terminal main stem bud (Topping) and / or side pruning of branches are considered as an adjustment for plant geometry of growthy cotton plants grown in fertile soils and /or received high nitrogen rates whether under dense or low plant population to eliminate lodging.

Bennett *et al.* (1965), Nasr and Azab (1969) and Naguib *et al* . (1978) reported that lint yield was increased by topping cotton plants. Kittock and Fry (1977) found that topping of S. 4 cotton at 15 days intervals(starting from mid July) decreased plant height and number of main stem nodes, increased boll set on top sympodia, additional branch nodes and bolls on top fruiting branches. Topping did not affect boll weight, lint yield and days to boll maturity, and was less effective when applied later in the season . El-Ganayni *et al.* (1984) started topping from 1 June up to 1August with 15 days intervals. They found that plants topped later produced the highest seed cotton yield while boll weight was not affected by topping . Roy *et al.* (1989) in Bangladesh, topped cotton plants after 45, 60 and 75 days from emergence at different plant population. Their results indicated that one plant /hill having 60x 30cm produced the highest seed cotton yield whereas the topping at 60 days produced the highest yield. The interaction effect showed that two plants/hill having 60x20cm and topped at 45 days gave highest seed cotton yield whereas lowest one was obtained by two plants /hill having spacing 63x20 cm and toping at 75 days after emergence.

Considerable data have been collected on the effects of fruit structure removal on growth and yield of cotton, Kennedy *et al.* (1986) indicated that prolonged removal of fruiting structures (i.e. flower buds, or young bolls) increases plant size, plant height , number of sympodial branches and fruit set. Economic yield of normal and okra leaf types was generally not improved by square removal . Ahmed and abdel-Al (1988)deflorated cotton plants of Giza 81 cultivar (leaving one flower every 2,3,4,5, or 7days)revealing positive response for plant height, number of internodes and boll weight, but reverselly with number of open bolls and seed cotton yield /plant. Basal 3,5 or 7 fruiting branches of cotton plants were removed at square stage by GU-Bellkang *et al.* (1990) and found that forty days after treatment, the number of sympodia/plant were gradually decreased in the three treatments compared with the check. However, seed cotton yield was increased Specially with 3 fruiting branches removed. Also, the number of fruiting nodes was not affected, while the squares and young bolls shedding were decreased and boll number/plant was increased by treatments. Kennedy *et al.*(1991) revealed that removal of early squares delayed the initation of fuiting and crop maturity whereas fruiting occurred

mor rapidly with prolonged fruiting period into the growing season. The effect of square removal on seed cotton yield was variable, from year to year.

Pettigrew (1994)applied partial fruit pruning and found 16% greater boll mass than the control.

The objective of these exeriments was to characterize the growth and development of the plants of growthy cotton cultivar Giza 89 topped and /or pruned at different plant population; plant height and all under higher nitrogen level of 90 kg/ feddan.

MATERIALS AND METHODS

Two field experiments were conducted on Giza 89 cotton cultivar (Gossypium barbadense L.) in 1996 and 1997 seasons at Sakha Agricultural Research Station in split plot design with four replications. The main plots were assigned for plant population in the term of hill spacing, i.e.20 and 25 cm, while the subplots were occupied with plant alternation treatments as: topping at 120cm height, side branch pruning when plants reached 120 cm height; topping + side branch pruning when plants reached 100cm height , and topping + side branch pruning when plants reached 120cm height besides the check(normal plants). Toping as well as side pruning were made by hand cutting of the terminal bud of main stem and monopodia or squares of sympodia along the plant up to the determind height, respectively. The plot size was 16.25m, including 5 ridges 65cm apart and 5 meters long.

Cotton seeds were planted March, 25 1996 and 1st April 1997. Nitrogen rate was 90 kg/fed. divided into two equal doses and 15.5 kg P_2O_5/fed. was added during land preparation without K ferilizer in order to create imbalanced fertilization which may induce more vegetative growth. All other cultural practices were done as recommended throughout the season.

Ten guarded plants from the three inner ridges of each plot were randomly chosen at the end of the season to determine the following criteria :

A- Vegetative growth habits: final plant height (cm); number of monopodia and number of main stem internodes/plant.

B- Fruiting growth habits: number of sympodia, additional fruiting branch bolls, number of aborted sites, number of retended bolls (additional fruiting branches

bolls+opened + unopened bolls) and number of fruiting sites (aborted sites+bolls retended).

C- Earliness measurements: days to first open boll; percentage of bolls on vegetative branches (number of bolls produced on fuiting branches arising from vegetative side branches, expressed as a percentage of total number of bolls produced) and

$$\text{earliness percentage:} \frac{\text{First picking}}{\text{First + second picking}} \times 100$$

D- Seed yield and its components : number of open bolls, number of unopen bolls; boll weight and seed cotton yield(kintar/fed.).

The interaction effects between plant population and plant alteration treatments on the above mentioned traits were also studied herein. The statistical combined analysis was performed according to Little and Hills (1978). The mean values were compared at the 5% level of significance (Snedecor and Cochran, 1967).

RESULTS AND DISCUSSION

I. Effect of plant population (hill spacing):

Data presented in Tables 1-4 clear a pronounced effect of plant population (hill spacing) on both vegetative and fruiting habits; earliness measurements and seed cotton yied and its components for the combined data. Final plant characteristics indicated that wide hill spacing significantly increased final plant height, number of monopodia, main stem internodes, sympodia additional fruiting branch bolls, retended bolls, fruiting sites, percentage of bolls on vegetative branches, number of open bolls, boll weight and seed cotton yied (kintar/fed.). On the other hand, narrow hill spacing markedly increased number of aborted sites, days to first open boll, earliness percentage and number of unopen bolls. These results could be ascribed on the basis that dense stands (narrow hill spacing) increase between-plant and within-plant competition resulting plants more susceptible to more demand for sunlight, water and nutrients. So, the end result of this competition is taller plants with more boll infestation and reproductive forms shed and that is compromised by the lack of boll formation and opening, predisposing it to delay in maturation and finally yield reduction. These results are in agreement to those obtained by Dave Guthrie *et al.* (1993) and Makram *et al.* (1994)forplant height, number of main stem internodes;

Nikolov (1980) for number of monopodia; Dave Guthrie *et al.* (1993) and Abd El-Malik *et al.* (1995) for number of sympodia, number of bolls retended, aborted sites, fruiting sites, percentage of bolls on vegetative branches and earliness percentage, and Risha (1993), Abd El-Malik (1988), Dave Guthrie *et al.* (1993) and Makram *et al.* (1994) for number of open and unopen bolls, boll weight and seed cotton yield/unit area.

II. Effect of plant growth alteration Treatments [topping (T) and /or side branch pruning (S.B.P)]:

A. Vegetative growth habits :

The combined data presented in Table 1 show that T and /or S.B.P. had a highly significant effect on this group of characters. It is obvious that topping cotton plants at a certain height i.e. 100cm or 120cm ceased plant height up to this limit of growth . On the other hand, S.B.P. only enhanced cotton plants for growth continuity resulting in tallest plants with highest main stem node number followed descendingly by the check, both T+S.B.P. at 120 cm,respectively. Number of monopodia was depressed as T, S.B.P.or both were appliend comparing with normal plants. Irrespective to the check, S.B.P. at 120cm had the highest monopodia, while T +S.B.P at 100 cm gained the lowest one leaving T at 120cm height in between values. These results could be asrcibed on the bases that topping cotton plants usually ultimates plant height at a specific or a required height bases on determinating vertical growth as apical dominance is intercepted while fruiting capacity is enhanced, modifying plant geometry into cone shape. As S.B.P. was applied, plant geometry was also modified but into arrow -like shape, whereas the unpruned top sympodial branches (above 120cm height) grew vertically and horizontally up to the end of season. Similar results were obtained by Kittock and Fry (1977) and Ahmed and Adel-Al(1990) for plant height and main stem nodes and kennedy *et al.* (1986) for plant size and plant height.

B. Fruiting growth habits:

Results in Table 2(combined of two seasons) reveal that cotton plants pruned to plant growth alteration treatments significantly exceed those of untreated check plants concerning this group of traits except for number of aborted sites whereas the superiority was assigned for the check plants. Cotton plants exposed to S.B.P. significantly surpassed those of both T.+S.B.P at 120cm and T. at 120 cm and T. + S.B.P at 100 cm height in descending order. Concerning additional fruiting branch

Table 1. Means of vegetative growth habits as affected by plant population and plant growth alteration treatments and their interaction (combined data of 1996 and 1997 seasons) of Giza 89 cotton cultivar.

Vegetative growth habits	Plant density D					Sig.	Plant growth alteration (D) [A]					D X A
	Season	Sig.	Hill spacing				Check (normal plants)	Topping at 120 cm height	Side branch pruning at cm height	T. + S.B.P. at 100 ccm height	T. + S.B.P. at 120 ccm height	Interaction Sig.
			20 cm	25 cm	30 cm							
Final plant height (cm)	1996	**	126.20	126.00	124.87 b	**	140.56 b	120.00 c	147.89 a	100.00 d	120.00 c	*
	1997	**	127.07	126.27	125.47 b	**	142.00 b	120.00 c	149.33 a	100.00 d	120.00 c	**
	Comb.	**	126.64	126.14	125.17 b	**	141.28 b	120.00 c	148.61 a	100.00 d	120.00 c	**
Number of monopodia	1996	**	0.30 c	0.45 b	1.03 a	**	0.90 a	0.54 c	0.67 b	0.40 e	0.47 d	**
	1997	**	0.36 c	0.59 b	1.36 a	**	1.08 a	0.72 c	0.83 b	0.56 d	0.67 c	**
	Comb.	**	0.33 c	0.52 b	1.20 a	**	0.99 a	0.63 c	0.75 b	0.48 d	0..57 c	**
Number of main stem intemodes	1996	**	23.53 b	23.53 b	24.93 a	**	26.56 b	22.56 c	28.33 a	20.00 d	22.56 c	N.S
	1997	**	24.40 b	24.33 b	26.00 a	**	27.78 b	23.11 c	29.89 a	20.44 d	23.33 c	N.S
	Comb.	**	23.97 b	23.93 b	25.47 a	**	27.17	22.84 c	29.11 a	20.22 d	22.95 c	N.S

Means designated by the same letter are not significantly different at 0.05 level according to L.S.D. test.

*,** and N.S. indicate P<0.05, 0.01 and not significant, respectively.

Table 2. Means of fruiting growth habits as affected by plant population, plant growth alteration treatments and their interaction (combined data of 1996 and 1997 seasons) of Giza 89 cotton cultivars.

Fruiting growth habits	Season	Sig.	Plant density (D)			Sig.	Plant growth alteration (A)					D X A
			Hill spacing				Check (normal plants)	Topping at 120 cm height	Side branch pruning at cm height	T. + S.B.P. at 100 ccm height	T. + S.B.P. at 120 ccm height	Interaction Sig.
			20 cm	25 cm	30 cm							
Number of sympoida	1996	**	14.67 c	16.73 b	18.93 a	**	19.22 b	15.11 c	21.33 a	12.78 d	15.44 c	N.S
	1997	**	15.40 c	17.33 b	19.93 a	**	20.44 b	15.78 c	22.56 a	13.11 d	15.89 c	N.S
	Com b.	**	15.04 c	17.06 b	19.43 a	**	19.83 b	15.45 c	21.95 a	12.95 d	15.67 c	N.S
Additional branch nodes	1996	**	2.09 c	3.13 b	4.57 a	**	1.73 e	2.68 d	3.60 c	3.92 b	4.39 a	N.S
	1997	**	2.27 c	3.28 b	4.78 a	**	1.92 e	2.83 d	3.79 c	4.08 b	4.59 a	N.S
	Com b.	**	2.18 c	3.21 b	4.68 a	**	1.83 e	2.76 d	3.70 c	4.00 b	4.49 a	N.S
Number of fruiting sites	1996	**	46.14 c	50.31 b	58.94 a	**	51.46 b	55.69 a	51.33 b	48.29 c	52.21 b	N.S
	1997	**	47.03 c	50.98 b	59.06 a	**	51.97 b	56.51 a	51.94 b	48.89 c	52.47 b	N.S
	Com b.	**	46.59 c	50.65 b	59.00 a	**	51 .72 d	56.10 a	51.64 b	48.59 c	52.44 b	N.S
Number of aborted sites	1996	**	11.73 a	11.46 ab	11.30 b	**	20.50 a	9.92 b	9.50 b	7.97 c	9.60 b	N.S
	1997	**	12.27 a	11.67 b	11.87 c	**	20.33 a	10.22 b	9.67 b	8.11 c	9.67 b	N.S
	Com b.	**	12.00 a	11.57 ab	11.09 b	**	20.42 a	10.07 b	9.59 b	8.04 c	9.64 b	N.S
Number of retended bolls	1996	**	32.31 c	35.72 b	43.07 a	**	29.22 d	43.09 a	38.23 b	36.40 c	38.22 b	**
	1997	**	32.69 c	36.03 b	43.41 a	**	29.71 d	43.46 a	38.49 b	36.70 c	38.54 b	**
	Com b.	**	32.50 c	35.88 b	43.24 a	**	29.47 d	43.28 a	39.36 b	36.55 c	38.38 b	**

Means disignated by the same letter are not significantly different at 0.05 level according to L.S.D. Test
** and N.S. indicates P <0.01 and not significant, respectively.

bolls which arise besides the principal bolls or on the bottom of sympodial branches, were significantly higher on plants proned to . T. +S.B.P at 120 cm followed descendingly by those exposed to T. S.B.P at 100 cm and T. at 120 cm height .

Cotton plants topped and pruned at 100 cm height had the highest aborted sites followed descendingly by T.at 120 cm, S,B.P at 120 and T.+ S.B.P at 120cm.

Regarding number of retended bolls and fruiting sites, the superiority was valued for plants proned to T.at 120 cm followed by both S.B.P at 120 cm and T.+ S.B.P. at 120 cm and T. S.B.P at 100 in descending order. From the above mentioned results, one of the most interesting observations was that the removal of the apical bud resulted in a large accumulation of assimilates in the root system, which suggests that there is an increase of the flow of nutrients to the sinks and consequently more assimilates towards the old fruits or for initiating new and additional fruits (Tollervey, 1970) . Also , a combination of topping and pruning or pruning alone was probably involved including: better light penetration into plant canopy, increased air circulation among plants resulting in an improved CO_2 supply for photosynthesis (Waggoner *et al.*, 1963), lower humidity, and a reduction in the amount of boll infestation on early set fruit (Bennett *et al.*, 1965). Such results were obtained by Kittock and Fry (1977) for boll set and additional branch bolls, Kennedy *et al.* (1986) for number of sympodia and fruit set and Gu-Benkang *et al.* (1990) for aborted sites and fruiting sites.

C. Earliness measurements:

In general, earliness measurements indicated by days to first open boll, percentage of bolls on vegetative branches and earliness percentage were significantly different with plant growth alteration treatments (Table 3). It is well noticed that untreated check plants were more late for opening of the first boll than treated plants. Reverselly, based on higher percentage of bolls on vegetative branches and lower earliness percentage, topped, pruned or both plants markedly tended to be later in maturation than the check ones. These results could be ascribed on the basis that altering plant growth with topping and /or pruning increased fruiting attributes (Table 2), so boll production period was prolonged although boll opening was accelerated. Bennett *et al.* (1965) found that topping did not affect days to boll maturity.

D. Seed cotton yield and its components:

Combined data in Table (4) show that altering plant growth by topping, prun-

ing or its combination significantly increased seed cotton yield and some yield components comparing with the check plants. Cotton plants topped at 120 cm height alone surpassed those of pruned at 120cm, T.+ S.B.P at 120 cm height concerning number of open and unopen bolls /plant , while it had the lowest magnitude regarding boll weight. Cotton plants topped at 120 cm or topped and pruned at 120 cm height resulted in the highest seed cotton yield followed descendingly by those pruned at 120 cm alone and topped+ pruned at 100cm height. Such results could be explained on the basis that topping the apical bud of cotton plant specially later in the season usually resulted in limited sympodial branches carrying more bolls on top ones which utilizes more assimilates. However, side branch pruning either alone or combined with topping lead to removing terminal squares of sympodia may move excess flow of assimilates towards the remaining fruit forms that is allow more and heavier bolls as well as it mininmize boll infestation and maximize boll set. Such findings were obtained by Bennett *et al* . (1965), Nasr and Azab (1969), Naguib *et al* . (1978), El-Genayni *et al.* (1984), Roy *et al.* (1989) and Gu-Benkang *et al.* (1990) for seed cotton yied; Ahmed and Abdel-Al (1990) for boll weight, but reverselly with number of open bolls and yield, Gu-Benkang *et al.* (1990) for number of open bolls, Pettigrew (1994) for boll weight.

E. Effect of the interaction between plant population and plant growth alteration treatments:

Combined data presented in Table (5) reveal noticeable effects for this factor on most traits studied herein except for number of main stem internodes, sympodia, additional fruiting branch boll, aborted sites, fruiting sites and days to first open boll/plant indicating the independent response of the later criteria for these factors. The remained data could be summarized as follows:

1- Pruning at 120cm height and 30 cm hill spacing gave highest plant height while lowest one was obtained by T. + S.B.P at 100 cm height for the three hill spacings used.

2- The check plants of 30 cm hill spacing gave highest monopodia while the lowest one was gained by T.+ S.B.P at 100cm height and 20 cm hill spacing.

3- Topping plants at 120 cm height and 30 cm hill spacing resulted in highest number of retended bolls, open bolls and seed cotton yield while lowest ones were obtained by check plants and 20 cm hill spacing .

4- Topped and pruned plants at 120cm height and 30 cm hill spacing produced highest percentage of bolls on vegetative branches while lowest one was obtained by the check plants of 20 cm hill spacing.

5- Untreated check plants and 20 cm hill spacing gave highest earliness percentage while lowest one was obtained by T. + S.B.P at 120cm height and 30cm hill spacing .

6- Cotton plants topped at 120 cm height and 20 cm hill spacing induced highest number of open bolls while lowest one resulted from the check plants and 20 cm hill spacing.

7- Pruned plants at 120 cm height and 25 cm hill spacing gave highest boll weight while lowest one was obtained by check and 20 cm hill spacing.

Roy *et al.* (1989) clarified that the interaction effect of two plants / hill having spacing 60 x 20 cm and topping at 45 days gave the highest seed cotton yield whereas the loweat one was obtained by two plants hill having spacing 63 x 20 cm and topping at 75 days emergence.

Table 3. Means of earliness measurements as affected by plant population, plant growth alteration treatments and their interaction (combined data of 1996 and 1997 seasons) of Giza 89 cotton cultivars.

Earliness masurements	Season	Sig.	Plant Density (D)			Sig.	Plant density (A)					D X A
			Hill spacing				Check (normal plants)	Topping at 120 cm height	Side branch pruning at 120 cm height	T. + S.B.P. at 100 ccm height	T. + S.B.P. at 120 ccm height	Interaction Sig.
			20 cm	25 cm	30 cm							
Days to first open boll	1996	**	123.3 a	122.4 b	122.0 b	**	125.3 a	122.4 b	121.9 c	121.2 d	121.9 c	N.S
	1997	**	123.5 a	122.7 b	122.3 b	**	125.6 a	122.6 b	122.2 c	121.5 a	122.2 c	N.S
	Com b.	**	123.40 a	122.55 b	122.15 b	**	125.45 a	122.50 b	122.05 b	121.35 d	122.05 c	N.S
Percentage of bolls on vgetative branches	1996	**	5.51 c	6.71 b	16.18 a	**	6.39 d	10.57 b	8.59 c	10.57 b	11.22 a	**
	1997	**	5.85 c	6.99 b	16.97 a	**	6.81 d	11.06 b	8.89 c	10.84 b	11.58 a	**
	Com b.	**	5.68 c	6.85 b	16.43 as	**	6.60 d	10.82 b	8.74 c	10.71 b	11.40 a	**
Earliness percentage	1996	**	69.94 a	68.25 b	59.91 b	**	72.20 a	63.86 c	66.26 b	65.43 b	62.42 d	**
	1997	**	68.12 a	67.02 a	58.97 b	**	69.96 a	63.28 c	65.29 b	63.78 c	61.22 d	**
	Com b.	**	69.06 a	67.64 a	59.44 b	**	71.08 a	63.57 d	65.78 b	64.61 c	61.82 e	**

Means disignated by the same letter are not significantly different at 0.05 level according to L.S.D. Test
** and N.S. indicate P <0.01 and not significant, respectively.

Table 4. Means of seed cotton yield and yield components as affected by plant population, plant growth alteration treatments and their interaction (combined data of 1996 and 1997 seasons) of Giza 89 cotton cultivar.

Yield and yield components	Season	Sig.	Plant density (D)			Sig.	Plant density (A)					D X A
			Hill spacing				Check (normal plants)	Topping at 120 cm height	Side branch pruning at 120 cm height	T. + S.B.P. at 100 ccm height	T. + S.B.P. at 120 ccm height	Interaction Sig.
			20 cm	25 cm	30 cm							
Number of open bolls	1996	**	16.52 c	21.45 b	29.89 a	**	19.69 d	25.82a	22.89c	20.30d	24.39b	**
	1997	**	17.05 c	21.96 b	30.45 a	**	20.31 d	26.33a	23.39c	20.70d	24.91b	**
	Comb.	**	16.79 c	21.71 b	30.17 a	**	20.00 d	26.08a	23.14c	20.50d	24.65b	**
Number of unopen bolls	1996	**	15.85 a	14.27 b	13.18 b	**	9.62 d	17.27a	15.34b	16.10b	13.83c	**
	1997	**	15.65 a	14.07 b	13.03 c	**	9.51 d	17.12a	15.10b	15.89b	13.63c	*
	Comb.	**	15.75 a	14.17 b	13.11 b	**	9.57 d	17.20a	15.22b	16.00b	13.73c	*
Boll weight (gm)	1996	**	2.21 b	2.37 a	2.31 a	**	2.20 b	2.21b	2.37a	2.34a	2.36a	**
	1997	**	2.28 b	2.44 a	2.40 a	**	2.28 b	2.30b	2.43a	2.42a	2.43a	*
	Comb.	**	2.25 b	2.41 a	2.36 a	**	2.24 b	2.26b	2.40a	2.38a	2.40s	*
Seed cotton yield (Kintar/fed.)	1996	**	11.69 c	13.03 b	15.41 a	**	11.10 d	14.71ab	13.90b	12.31c	14.85a	**
	1997	**	12.43 c	13.69 b	16.24 a	**	11.79d	15.54a	14.62b	13.05c	15.61a	**
	Comb.	**	12.06 c	13.36 b	15.83 a	**	11.45d	15.13a	14.26b	12.68c	15.23a	**

Means disignated by the same letter are not significantly different at 0.05 level according to L.S.D. Test
** and N.S. indicate P <0.01,0.05 and not significant, respectively.

Table 5. Means of some traits studied as significantly affected by the interaction between plant population and plant growth alteration treatments (combined data of both 1996 and 1997 seasons) of Giza 89 cotton cultivar.

Plant alteration treatment / Hill spacing	Final plant height					Number of open bolls				
	Check	T.at 120 cm height	P.at 120 cm height	T.+P.at 100 cm height	T.+P.at 120 cm height	Check	T.at 120 cm height	P.at 120 cm height	T.+P.at 100 cm height	T.+P.at 120 cm height
20 cm	143.33 b	120.00 d	149.84 a	100.00a	120.00 d	13.39 m	18.77 ij	16.87 kl	15.471	19.44 hi
25 cm	140.67 c	120.00 d	145.17 b	100.00a	120.00 d	17.29 jk	24.67 de	22.42 fg	21.07 gh	23.12 ef
30 cm	139.83 c	120.00 d	150.84 a	100.00a	120.00 d	29.34 c	34.80 a	30.14 bc	25.17 d	31.40 b
	Number of monopodia					Number of unopen bolls				
20 cm	0.37 gh	0.32 gh	0.40 fg	0.24 h	0.34 gh	9.97 ef	20.04 a	16.90 bc	16.28 bc	15.55 cd
25 cm	0.65 de	0.48 fg	0.57 ef	0.44 fg	0.49 fg	9.37 f	17.22 b	14.38 d	15.72 bcd	14.19 d
30 cm	1.95 a	1.10 c	1.28 b	0.77 de	0.89 cd	9.37 f	14.33 d	14.39 d	15.99 bc	11.47 e
	Number of retended bolls					Boll weight				
20 cm	23.22 j	38.80 d	33.77 g	31.75 h	34.99 fg	2.10 e	2.12 e	2.30 d	2.34 cd	2.37 bcd
25 cm	26.65 i	41.89 c	36.80 e	36.75 ef	37.30 de	2.32 d	2.34 cd	2.55 a	2.40 bc	2.44 b
30 cm	38.54 de	49.13 a	44.52 b	41.15 c	42.87 bc	2.30 d	2.32 d	2.35 cd	2.42 bc	2.38 bcd
	Percentage of bolls on vegetative branches					Seed cotton yield (Kintar/fed.)				
20 cm	4.10 i	6.37 f	4.62 h	6.55 f	6.77 f	8.99 i	12.70 fg	12.39 fg	11.53 gh	14.67
25 cm	5.42 g	7.80 e	6.17 f	6.80 f	8.07 e	10.22 h	14.70 cd	14.59 cde	12.93 f	cde
30 cm	10.29 d	18.27 b	15.44 c	18.77 a	19.37 a	15.12 cd	17.98 a	15.80 bc	13.59 ef	14.38 de
	Earliness percentage									16.65 b
20 cm	73.09 a	66.12 ef	68.87 cd	70.82 bc	66.12 ef					
25 cm	72.12 ab	65.87 f	67.70 de	66.97 ef	65.50 f					
30 cm	67.99 de	58.69 h	60.67 g	55.99 i	53.82 j					

For every trait, means designated by the same letter are not significantly different at 0.05 level according to L.S.D. test.

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تأثير المسافات بين الجور وإزالة البرعم الطرفى للأفرع الثمرية (التقليم) أو كلاهما عند ارتفاعات نبات مختلفه لصنف القطن جيزه ٨٩

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مركز البحوث الزراعية- معهد بحوث القطن.

إقيمت تجربتان حقليتان بمحطة البحوث الزراعية بسخا موسمى ١٩٩٦و ١٩٩٧م على صنف القطن الجديد جيزة ٨٩ لدراسة تأثير المسافات بين الجور (٢٠،٢٥،٣٠سم) ومعاملات تهذيب نمو نبات القطن (المقارنة ، تطويش عند ارتفاع ١٢٠سم ، تقليم الافرع الثمريه ١٢٠سم + تطويش + تقليم عند ارتفاع ١٠٠سم ، تطويش + تقليم عند ارتفاع ١٢٠سم) على بعض صفات النمو الخضرى والثمرى ومقاييس التبكير ومحصول القطن الزهر ومكوناته.

اوضح التحليل الاحصائى المشترك للموسمين ان المسافات الواسعة بين الجور أدت الى زياده عدد كل من الافرع الخضرية وسلاميات الساق الرئيسية والافرع الثمرية والافرع الثمرية الاضافية الحاملة للوز واللوز العاقد والمواقع الثمرية والنسبة الثمرية للوز على الافرع الخضرية واللوز المتفتح ووزن اللوزة ومحصول القطن الزهر (قنطار / فدان) ، بينما ادت إلى نقص الطول النهائى للنبات وعدد المواقع الثمرية الخالية وعدد الأيام حتى تفتح اول لوزه والنسبة المئويه للتبكير وعدد اللوز غير المتفتح.

بصفة عامة أدت معاملات تهذيب نمو نبات القطن إلى تاثير ايجابى على معظم الصفات المدروسة وعلى العكس ادت الى نقص عدد الافرع الخضرية والمواقع الثمرية الخالية والنسبة المئوية للتبكير بالمقارنة بالنباتات غير المعاملة . وكانت الفروق فيما بين معاملات تهذيب نبات القطن معنوية وعند استبعاد معاملة المقارنة يتضح ان التطويش عند ارتفاع ١٢٠سم زاد من عدد اللوز العاقد والمواقع الثمرية وعدد الايام حتى تفتح اول لوزة واللوز المتفتح وغير المتفتح ومحصول القطن الزهر (قنطار / فدان) . كذلك ادى تقليم الافرع الثمريه عند ارتفاع ١٢٠ سم الى زياده الطول النهائى للنبات والافرع الخضرية وسلاميات الساق الرئيسية والافرع الثمرية والنسبة المئوية للتبكير ووزن اللوزة.

أدى التطويش والتقليم عند ارتفاع ١٠٠ سم الى نقص عدد المواقع الثمرية الخالية. أيضا ادى التطويش والتقليم عند ارتفاع ١٢٠ سم الى زيادة عدد الافرع الثمرية الإضافية الحاملة للوز والنسبة المئوية للوز على الافرع الخضرية ووزن اللوزة ومحصول القطن الزهر (قنطار / فدان).

ومن ابرز نتائج التفاعل بين المسافات بين الجور ومعاملات تهذيب نمو القطن التى ادت الى زياده عدد اللوزالعاقد واللوز المتفتح ومحصول القطن الزهر هى التطويش عند ارتفاع ١٢٠ سم مع ٣٠سم بين الجور .