EFFECT OF SOME CULTURAL PRACTICES ON GROWTH, FLOWERING, EARLINESS CHARACTERS AND YIELD OF COTTON PLANT VARIETY GIZA 90 (GOSSYPIUM BARBADENSE L.)

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Abstract

Two field experiments were conducted at Shandaweel Agric. Res. Station (Sohag governorate), Egypt in 2008 and 2009 seasons to study the effect of two population density (43076 and 64615 plants/fed.) through four plant distributions, (10 cm. and 1 plant/hill), (20 cm. and 2 plants/hill), equal 64615 plants/fed. and (15 cm. and 1 plant/hill), (30 cm. and 2 plants/hill) equal 43076 plants/fed. and three levels of nitrogen fertilization (45, 60 and 75 kg N /fed.) on growth, flowering and earliness characters on Egyptian cotton (Gossypium barbadense L.) cultivar (Giza 90). The high population 64615 plants/fed. through plant distribution (10 cm. and 1 plant/hill) increased plant height at all ages as well as at harvest, the first fruiting node, days to first flower appearance in both seasons and days to first open boll appearance in the first season. Meanwhile, the plant distribution (20 cm. and 2 plants/fed. with the same density 64615 plants/fed.) increased days to first open boll appearance in the second season. Increasing plant spacing up to 30 cm. 2 plants/hill (43076 plants/fed.) gave the highest value of number of monopodia and sympodia branches/plant at all ages and at harvest in both seasons, number of green leaves /plant at all ages in 2008 and at 105 age in 2009, dry weight of leaves (gm) at 75, 135and 105 ages in the both seasons, dry weight of reproductive organs/plant at ages 105 and 135 in both seasons, total dry weight/plant at ages 75, 135and 105, 135 in the first and second season, respectively, leaf area per plant at age 135 in the first season, earliness percentage and number of flowers /plant, Shedding percentage of bolls in both seasons and second season respectively. While, 15 cm. 1 plant/hill with the same density gave highly significant increase number of green leaves /plant at age 75 and 135 in the second season, dry weight of leaves at 105 age and 75, 135 ages in the first and second season respectively, dry weight of reproductive organs/plant at age 75 in both seasons, total dry weight/plant at ages 105 and 75 in the first and second season respectively, leaf area per plant at age 75, 105 and at all ages in the first and second seasons respectively and number of flowers /plant, Shedding percentage of bolls in the first season. Application of nitrogen fertilizer up to 75 kg N/fed. significantly increased plant height, number of monopodia and sympodia branches/plant, number of green leaves /plant, dry weight of leaves, dry weight of reproductive organs/plant, total dry weight/plant, leaf area /plant, the first fruiting node, days to first flower and open boll appearance, number of flowers /plant and shedding percentage of bolls in the second season. While, decreasing nitrogen fertilizer up to (45 kg N/fed.) led to significant increase in earliness percentage in both seasons.

Interaction between population density and nitrogen fertilizer was insignificant on all attributes studied, except, number of monopodia branches at ages 75 and 105, total dry weight/plant at age 135, the first fruiting node, number of flowers /plant and shedding percentage of bolls in the first season, dry weight of leaves at ages 75 and 105, leaf area /plant at 105 age and earliness percentage in the second season, number of sympodia branches/plant at harvest, number of green leaves per plant at ages 75 and 105 and days to first flower appearance in both seasons.

For yield and yield component, increasing plant spacing up to15cm.1 plant/hill or 30cm.2 plants/hill equal(43076 plants/fed.)gave the highest value of number of open bolls and seed cotton yield/plant and boll weight in two seasons and at the first season respectively ,plant spacing at 20cm. between hills and 2 plants/hills(64615 plants/fed.)gave highly significant increase seed cotton yield and lint yield ken./fed. in both seasons and first season respectively, increasing plant spacing between hills (43076 plants/fed.) gave a significant increase in lint percentage in both seasons seed index and oil percentage in the second season .Application of nitrogen fertilizer up to high rate 75 kg n/fed. significantly increased the number of unopen bolls, boll weight, seed cotton yield, seed cotton yield ,lint yield/fed. and seed index. While, deceasing nitrogen fertilizer up to (45 kg N/fed.)led to significant increase in number of open bolls/plant and lint percentage in both seasons. The interaction between population density through plant distribution and nitrogen fertilizer was insignificant on all attributes stud, except, seed cotton yield/plant. The higher yield was obtained from the planting at (20cm. between hills and 2 plant/hill)x75 kg N/fed. in both seasons.

INTRODUCTION

Cotton (*Gossypium barbadense L.*) is considered the main fiber crop in Egypt as well as the world. Therefore, a great effort should be continued to improve its quality and quantity either through cultural practices and breeding programs. The cotton yield or any other economic character, is influenced by the various agronomic practices especially the amount of fertilizers or plant density. Therefore, the important question is, what is the most suitable amount of nitrogen fertilizer, how many plants per fed. are needed with suitable distribution for these plants in the field to obtain the maximum yield with high quality.

Population density in cotton is aimed to find the desirable number of plants per fed. and the suitable distribution for these plants in order to decrease competition between plants within hill on environmental requirements and produce higher yields and good quality. Obasi & Msaakpa (2005), El-Hindi *et. al.* (2006), Hamed (2006) and

Mahdi (2007) found that the low plant density showed significant increment in number of fruiting branches/plant. Abo-Shetaia *et. al.* (2008) and El-Samad *et. al.* (2008) found that plant height increased significantly as plant density was increased. While, decreasing plant density led to increasing monopodia branches, number of leaves/plant, dry weight of leaves/plant and leaf area/plant. On the contrary, El-Hindi *et. al.* (2006) stated that increasing plant density led to decrease plant height. Mahatale *et. al.* (2003) found that the number of leaves, number of monopodial branches and dry matter/plant. Heitholt (1995) found that wider spacing recorded the higher values of number of flowers and shedding percentage. El-Shahawy *et. al.* (1997) revealed that increasing population density significantly increased shedding percentage, plant height and earliness percentage. While, decreasing plant density led to a significant increase in number of monopodial branches/plant. Mahdi (2007) found that high plant density of 93.333 plants/fed. resulted the highest values of plant height, node number of first sympodium, days to first flower and first open boll.

Hamed (2006), El-Hindi *et. al.* (2006)and Mahdi (2007) ,reported that decreasing population density increased No. open bolls/plant, boll weight, and seed cotton yield/plant. While, El-Samad *et. al.* (2008), and Wrather *et. al.* (2008).found that the high plant density resulted the highest values of seed cotton yield/fed. and lint yield/fed.m. Molin and hugie (2010) recorded that the highest lint percentage obtained from the highest plant density. .

Nitrogen is an important factor limiting plant growth. The response of cotton plants to nitrogen fertilization depends mainly on soil fertility level and cotton variety. Therefore, it is suitable to apply nitrogen fertilizer in an adequate amount necessary for plant nutrition to produce higher yields with good quality. El-Ganaini *et. al.* (2005) found that plant height, number of leaves per plant, leaf area per plant and dry weight of leaves per plant, number of fruiting branches per plant and average weight of bolls per increased with increasing rates of nitrogen. Ansari and Mahey (2003) found that plant height, total dry weight, leaf area and reproductive dry matter production increased with increasing N level up to 80 kg/ha. El-Hindi *et. al.* (2006) found that nitrogen fertilizer levels had marked effects on number of days from sowing to the first flower opening and boll opening, number of fruiting branches/plant, plant height. Mahdi (2007) found that adding 90 kg N/fed. showed the highest values for node number of first sympodium, days to first flower and first open boll. While, number of fruiting branches/plant and plant height were not significantly affected by nitrogen fertilizer rates. El-Tabbakh (2002a)) showed that plant height increased by increasing N rate. While, ginning percentage and yield earliness declining trend with an increase in N rate. Mc-Connell *et. al.* (1993) reported that earliness was reduced by increasing N rate. El-Shahawy & Abd El-Malik (1999) found that the highest N rate increased final plant height, number of monopodia, sympodia, boll retention, dry weight of vegetative and fruiting parts and total dry weight. Increasing nitrogen levels delayed maturation as presented by higher nodal position of the first sympodium, days to both first open flower and boll and lower earliness percentage. El-Shahawy et. al. (1997) revealed that final plant height, number of monopodial and sympodial branches/plant, boll setting percentage significantly increased by increasing nitrogen level, while shedding and earliness percentage had a reverse trend.

Ibrahim (2008) found that No. of open bolls/plant, No. of unopen bolls/plant, boll weight, seed index, lint percentage, seed cotton yield per plant and fed., increased significantly by increased NPK fertilizers levels. While, Darwish and Hegab (2000), found that lint percentage increased by decreasing N levels. Mahdi (2007) found the highest nitrogen levels increased No. of open bolls/plant, boll weight, seed cotton yield per plant and fed. While, lint percentage and seed index were not significantly affected by nitrogen fertilizer levels.

MATERIALS AND METHODS

The present investigation was carried out at Shandaweel Agric. Res. Station (Sohag governorate), ARC, during the two successive growing seasons 2008 and 2009, using the Egyption cotton cultivar Giza 90. A split-plot design with four replications during the two seasons. The plant density represented the main plots and nitrogen fertilization represented the sub-plots. The area of the experimental plot was 20.47 m^2 (4.5 meters length and 4.55 meters width). Each plot consisted of 7 rows, spacing between rows were 65 cm.

The factors study:

A- Population density through plant distribution:

1. 10 cm between hills (one plant per hill) i.e., 64615 plants per feddan.
2. 15 cm between hills (one plant per hill) i.e., 43076 plants per feddan.
3. 20 cm between hills (two plants per hill) i.e., 64615 plants per feddan.
4. 30 cm between hills (two plants per hill) i.e., 43076 plants per feddan.

Planting was done by the local method of dibbling 5 to 7 seeds in each hill by hand at the last week of March and thinning was carried out after about 35 days after planting, leaving the required number of plants per hill.

B. Nitrogen fertilization levels:

1. 45 kg N/fed. 2. 60 kg N/fed. 3. 75 kg N/fed.

Nitrogen fertilization in form of ammonium nitrate (33 % N) was applied according to different treatments at two equal portions, the first portion applied before the second irrigation and the 2 nd one was applied before the 3 rd irrigation.

Table 1. Physical and chemical properties of the upper 40 cm of the experimental soil sites in 2008 and 2009 seasons.

Properties		2008 season	2009 season
Physical analysis	Sand%	20%	18%
	Silt	50%	52%
	Clay	30%	30%
Soil texture	Silt clay loam		
Chemical analysis	S.P	67.0	66.0
	pH (1:1)	7.66	7.60
	O.M	1.68	1.70
	CaCo3 %	3.88	3.90
	E.C (mm /cm)	1.6	1.65
	So_4 meq /L	2.0	3.0
	CL meq /L	4.0	4.0
	Co_3&HCo_3 meq /L	10.0	9.5
	Ca meq /L	7.0	8.0
	Mg meq /L	6.24	6.0
	Na meq /L	2.36	2.09
	Total N %	1.8	1.6
	Total P (ppm)	55	51
	Total K (ppm)	251	229

Table 2. Mean of temperature during experimental seasons.

Month	Aver. Tem. °C					
	2008			2009		
	T. Max.	T. Min.	Mean	T. Max.	T. Min.	Mean
March	26.36	9.87	18.12	25.03	8.44	16.74
April	34.28	16.71	25.50	33.8	12.0	22.9
May	36.55	22.43	29.49	34.51	18.66	26.59
June	40.46	23.38	31.92	40.73	23.73	32.23
July	40.95	24.63	32.79	41.41	28.54	34.98
August	39.1	22.92	31.01	38.12	22.91	30.52
September	35.8	21.04	28.42	37.2	21.28	29.24
October	34.08	18.87	26.48	34.64	18.64	26.64

Source: Sohag Agrometeorological station.

Data recorded:

A. Growth traits:

During the growing season, growth characters were estimated during the vegetative and budding, flowering and bolling stages at 75, 105 and 135 days from planting in the tow seasons to determine the following traits:

1. Plant height (cm.): It was estimated in cm, from cotyledonary nodes to the top of the plant, at different plant ages, i.e., 75, 105, 135 days after planting (DAP) and at harvest.
2. Number of monopodia branches/plant at different plant ages, i.e., 75, 105, 135 DAP and at harvest.
3. Number of sympodia branches/plant at different plant ages, i.e., 75, 105, 135 DAP and at harvest.
4. Number of green leaves per plant at different plant ages, i.e., 75, 105 and 135 DAP.
5. Dry weight of leaves (gm) at different plant ages, i.e., 75, 105 and 135 DAP.
6. Dry weight of reproductive organs/plant (gm) at different plant ages, i.e., 75, 105 and 135 DAP.
7. Total dry weight/plant (gm) at different plant ages, i.e., 75, 105 and 135 DAP.
8. Leaf area per plant at different plant ages, i.e., 75, 105 and 135 DAP. was estimated according to the following equation:

$$\frac{\text{Dry weight of leaves / plant} \quad x \quad \text{discs area in cm2}}{\text{Dry weight of leaf discs / plant}}$$

B- Flowering and earliness traits:

1- The first fruiting node: It was calculated by counting number of nodes from the tow cotyledons nodes (0.0) to the location of first fruiting branch.

2- Days to first flower appearance: the number of days from planting until the appearance of first flower was determined.

3- Days to first open boll appearance were determined as days from planting until the appearance of first open boll.

4- Earliness percentage: This character was estimated according to the following formula:

$$= \frac{\text{Average seed cotton yield of first picking}}{\text{Average seed cotton of the total picking (first + second)}} \times 100$$

5- Number of flowers per plant.

6- Shedding percentage of bolls: It was calculated from the following equation:

$$= \frac{\text{Total number flowers/plant - total number of bolls/plant}}{\text{Total number flowers /plant}} \times 100$$

C- Distribution of flowers during the flowering period:

Flowers were counted daily, and then each flower was labelled according to its appearance. Flowering data was used for flowering curves as well as the estimation of the effect of population density through plant distribution and nitrogen fertilization upon flowering.

D-Yield and its component :

1-Number of open bolls /plant the average number of open bolls/plant was calculated by counting the open bolls on the above the representative plants before the first and second piking.

2-Number of unopen bolls/plant.

3-Averagseed cotton yield in grams/plant: It was estimate from the above ten representative plants.

4-Bollweight in grams :the average boll weight was estimated as follow:

$$\text{Boll weight} = \frac{\text{Seed cotton yield /plant in grams}}{\text{Number of harvested boll/plant}}$$

5-Seed cotton yield/feddan in kentars :seed cotton yield /plot in kilograms was recorded and transformed to kentars /feddan (one kentar=157.5kg).the seed cotton was picked twice in two seasons, in picking only four rows in the middle of each plot were selected to be picked in order to avoide any border effect.

6-Lint yield /feddan in kentar

7-Lint percentage :calculated from the following equation :

$$\text{Lint percentage} = \frac{\text{Weight of lint cotton}}{\text{Weight of seed cotton}} \times 100$$

8-seed index :Weight of 100 seeds in grams.

The collected data were subjected to the proper statistical analysis of split plot design according to the procedure outlined by **Snedecor and Cochran (1981)**. For comparison between means, L.S.D. at 5% level of probability was used.

RESULTS AND DISCUSSION

Effect of population density through plant distribution, nitrogen fertilization levels and their interaction on

A- Growth traits

Results presented in Tables (3, 4, 5, and 6) revealed that decreasing population density from (64615 plants/fed.) to (43076 plants/fed.) through plant distribution at a wider distance (30 cm 2 plants/hill) led to a significant increase in number of monopodia and sympodia branches/plant at all ages under study, in both seasons, number of green leaves /plant at all ages in the first season and at 105 age in the second season, dry weight of leaves (gm) at 75, 135and 105 ages in the first and second season respectively, dry weight of reproductive organs/plant at ages 105 and 135 in both seasons, total dry weight/plant at ages 75, 135and 105, 135 DAP in the first and second season, respectively, leaf area per plant at age 135 in the first season. However, plant distribution (15 cm 1 plant/hill) with the same density (43076 plants/fed.) gave highly significant increase in other ages to the previous characters. This trend could be explained on the fact that in case of low population density produced by expanding hill spacing, plants would have better opportunity to produce more metabolite contents and increased leaf area of plants at all plant ages and a positive effect on plant growth and productivity. Similar findings were obtained by Mahatale *et. al.* (2003), Obasi & Msaakpa (2005), Mahdi (2007), Abo-Shetaia *et. al.* (2008) and El-Samad *et. al.* (2008). However, the high population 64615 plants/fed. through different distances (10 cm. and 1 plant/hill) increased plant height at all ages and at harvest in both seasons. These averages were 56.06, 120.78, 135.61 and 141.15 cm at 75, 105, 135 DAP and at harvest during 2008 season. The corresponding averages during 2009 season were 67.78, 133.22, 164.94 and 179.68 cm for the ages 75, 105, 135 days after planting and at harvest. This increment in plant height could be explained that higher dense of plants excessive shade exist which help to produce more content of gibberelin in tissues and consequently higher plants formed. These results are in harmony with those obtained by Mahdi (2007), Abo-Shetaia *et. al.* (2008) and El-Samad *et. al.* (2008).

Data presented in Tables (3, 4, 5 and 6), clear that increasing nitrogen fertilizer level up to 75 kg N/fed. Significantly increased plant height, number of monopodia, sympodia branches, number of green leaves, dry weight of leaves, dry weight of reproductive organs, total dry weight/plant and leaf area /plant. This may be due to strong the vegetative growth and produced more from vegetative growth, plant height, dry weight per plant, number of fruiting branches also, it is obvious that Giza 90 variety respond to the increase of nitrogen fertilization. This result is in harmony with that reported by. Similar results were obtained by El-Shahawy & Abd El-Malik (1999), Ansari & Mahey (2003), El-Ganaini et. al. (2005)and El-Hindi et. al. (2006).

The results recorded in Tables (3, 4, 5 and 6) indicate that interaction between population density through plant distribution and nitrogen fertilizer treatment had significant on number of monopodia branches at ages 75 and 105 days and total dry weight/plant at age 135 days in the first season, dry weight of leaves at ages 75 and 105 days and leaf area /plant at 105 days in the second season, number of sympodia branches/plant at harvest and number of green leaves /plant at ages 75 and 105 DAP in both seasons.

B- Flowering and earliness traits

Results present in Table (7) revealed that decreasing population density from (64615 to 43076 plants/fed.) led to a significant increase in earliness percentage and number of flowers /plant, shedding percentage of bolls in both seasons. These results could be attributed to high the competition between plants on nutrient elements, light intensity and moisture in case of close distance between hills which led to a depression in the amount of metabolites synthesized in cotton plants, on the other hand wider spacing allowed for more dry matter distribution allocated to the new grown leaves, branches and thus led to increase earliness percentage and higher number of flower/plant. Similar findings were obtained by Heitholt (1995). However, the high population 64615 plants/fed. through a closer distance (10 cm. and 1 plant/hill) increased the first fruiting node in both seasons, days to first flower appearance in both seasons, days to first open boll appearance in the first season. Meanwhile, the plant distribution (20 cm. and 2 plants/fed. with the same density 64615 plants/fed.) increased days to first open boll appearance in the second season. The obtained results are in agreement with those conducted by Obasi & Msaakpa (2005) and Mahdi (2007).

Results in Table (7) indicated that nitrogen fertilizer levels significantly increase the first fruiting node in first season, days to first flower and open boll appearance in both seasons, number of flowers and shedding percentage of bolls per plant in the second season. These results possibly due to that higher nitrogen level causes excessive vegetative growth consequently resulted in higher node location of first sympodium, delaying the appearance of first flower and opening boll and caused production of more flowers per plant. The obtained results are in agreement with those conducted by Raza *et. al.* (2004), El-Hindi *et. al.* (2006)and Mahdi (2007).While, decreasing nitrogen fertilizer led to significant increase in earliness percentage this effect was significant in the first and second seasons. The highest values (71.56 % and 67.48 %) were obtained when nitrogen was applied at a rate of 45 kg N/fed., during 2008 and 2009 season, respectively. These results are in agreement with El-Shahawy & Abd El-Malik (1999) and El-Tabbakh (2002a).

Data presented in Table (7) show the interaction between population density and nitrogen fertilizer treatments significantly on the first fruiting node, number of flowers and shedding percentage of bolls per plant in the first season and first flower appearance in both seasons and earliness percentage, in the second season.

C- Distribution of flowers during the flowering

The general trend of chape of the curves of the accumulative number of flowers produced per plant during the flowering period for plants growing in four plant distribution in 2008 and 2009 was similar as shown in Fig (1-12).

The effect of population density through plant distribution on number of flowers, in weeks and its cumulative percentage are presented in Figs (1 and 2) which show the shape curves for the different plant distribution. The difference in the cumulative number of flowers per plant was low in the early part of flowering period and increased with progress of the towards maturity as shown in Fig (1 and 2) .Low population density (43076 plants/fed.) throw plant distribution (15 cm. between hills and 1 plant/hill) in the first seasons and at sowing (30 cm. between hills and 2 plants/hill) in the second season gave the highest values from cumulative percentage of flowers produced per plant at weekly intervals and caused an extension of flowering period because retarded flowering. This may be the strong growth vegetables. These results were coincided with that obtained by Clawson *et. al.* (2008).

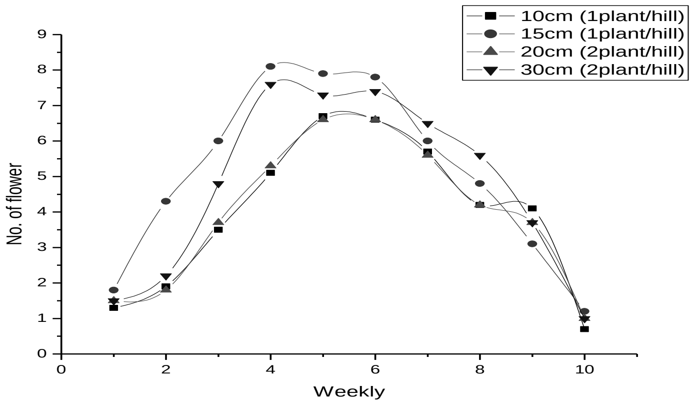

Fig 1. Flowering distribution at weekly intervals of four plant distribution at different nitrogen in 2008 season.

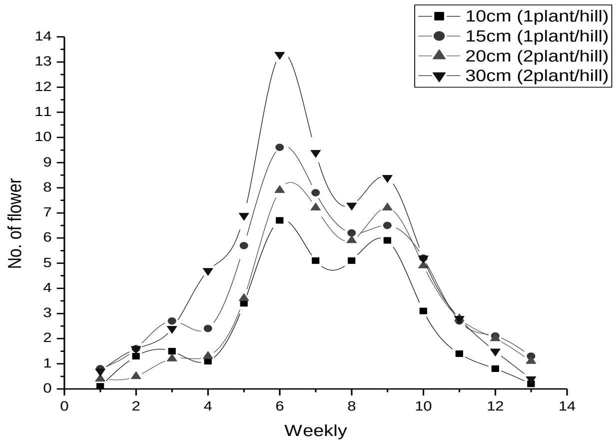

Fig. 2. Flowering distribution at weekly intervals of four plant distribution at different nitrogen in 2009season

For the effect of nitrogen levels on number of flowers, in weeks and its accumulative percentage are presented in Fig (3 and 4) which show the shape of curves for the different nitrogen level. Increasing nitrogen application up to 60 kg N/fed. and 75 kg N/fed. in the first and second seasons increased number of flowers per plant till the end of the

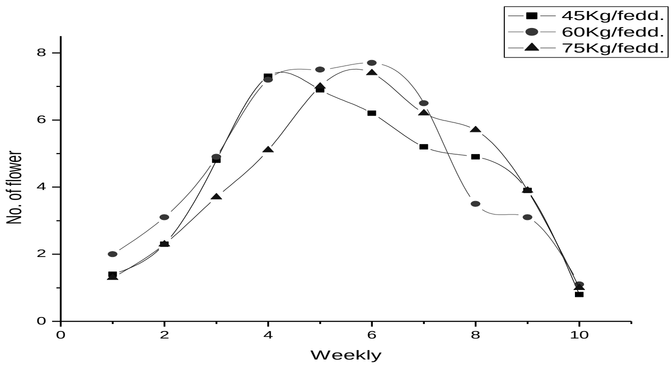

Fig .3. Flowering distribution at weekly intervals of three nitrogen levels at different plant distribution levels in 2008 season.

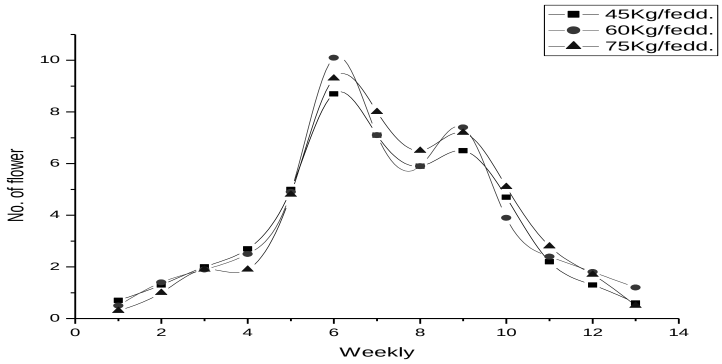

Fig.4. Flowering distribution at weekly intervals of three nitrogen levels at different plant distribution levels in 2009 season.

flowering season, respectively. The curve peak reached its maximum of flower production at approximately sixth week from flowering in the both seasons. The cumulative number of flowers per plant was low in the early part of flowering period and increased with progress of the towards maturity.

Generally, the slow starting of flowering at the beginning of flowering period by increasing nitrogen level may be due to that higher nitrogen rates retarded flowering as a result of increasing the period of vegetative growth. Also, the increase in flowering rate after this period could be explained on the basis that higher nitrogen applications increased flower production and therefore it prolonged the flowering habit of the plant. Similar findings were obtained by Raza *et. al.* (2004).

The interaction of population density through four plant distribution and nitrogen fertilization levels for Giza 90 variety are illustrated in Figs (5-12). Which that the different curves shapes for the interaction between the population density and nitrogen levels.

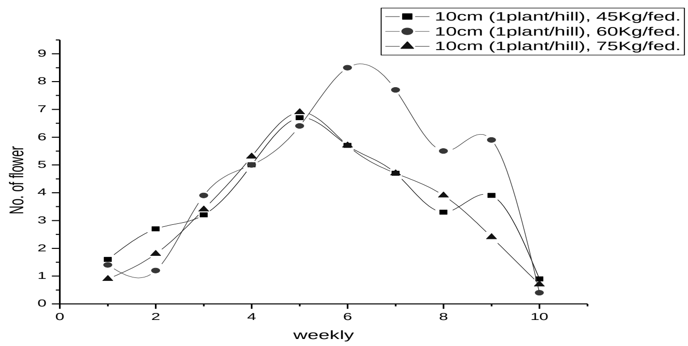

Fig. 5.Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (10 cm and 1 plant/hill) in 2008 season.

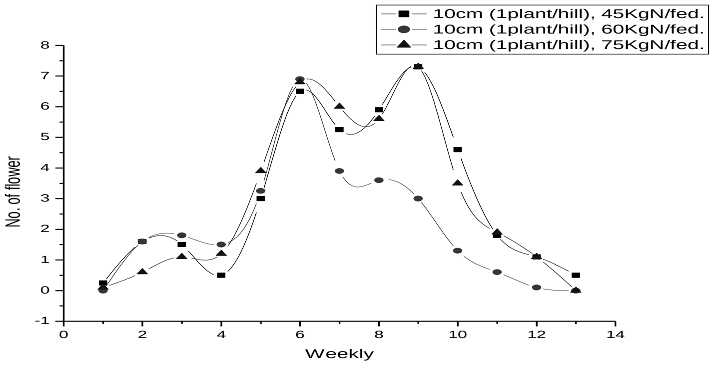

Fig.6. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (10 cm and 1 plant/hill) in 2009 season.

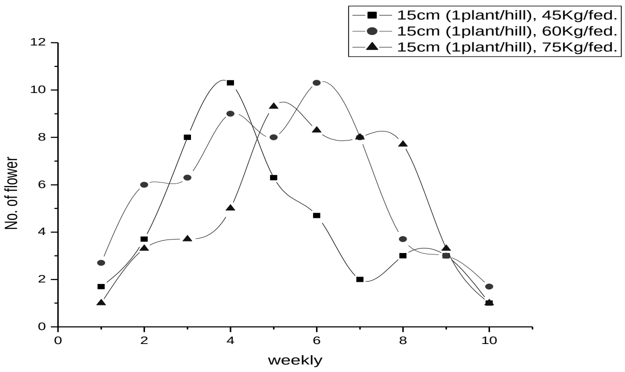

Fig. 7. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (15 cm and 1 plant/hill) in 2008 season.

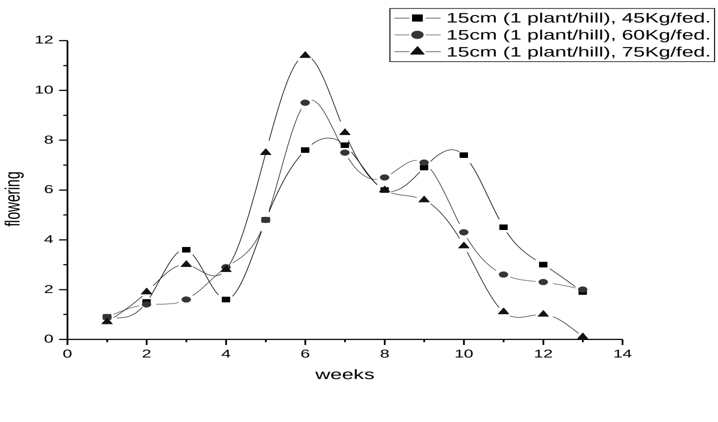

Fig. 8. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (15 cm and 1 plant/hill) in 2009 season.

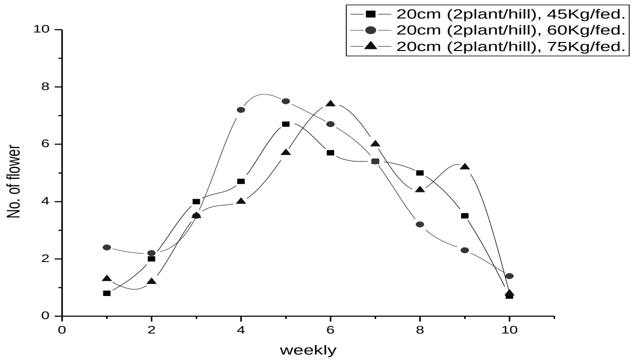

Fig. 9. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (20 cm and 2 plants/hill) in 2008 season.

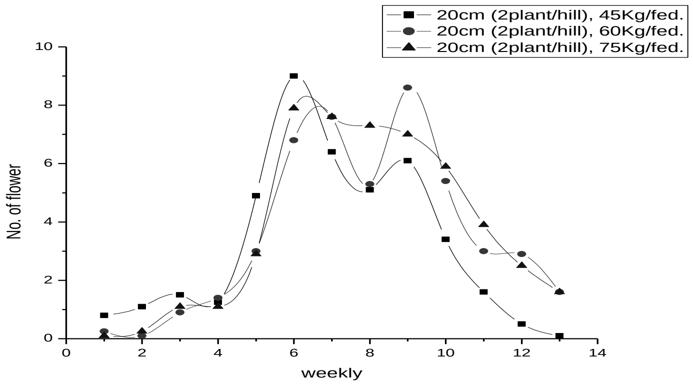

Fig.10. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (20cm and 2 plants/hill) in 2009 season.

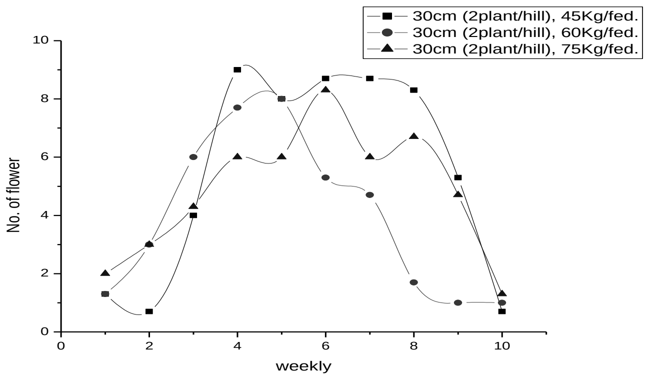

Fig. 11. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (30 cm and 2 plants/hill) in 2008 season.

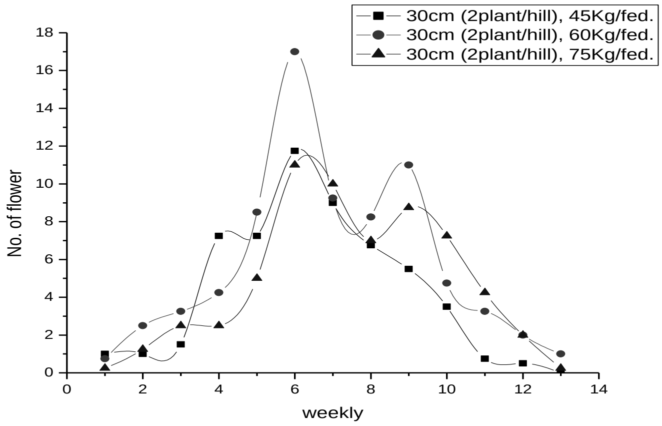

Fig. 12. Flowering distribution at weekly intervals of three nitrogen levels at plant distribution (30 cm and 2 plants/hill) in 2009 season.

D. Yield and Yield components

Results presented in tables (8and9) revealed that decreasing population density from (64615 plants/fed) to (43076plants/fed.)through plant distribution led to a significant increase in number of open bolls/plant, seed index and seed cotton yield in both seasons, average boll weight and lint percentage in the second season and number of unopen bolls/plant in the first season .these results might be due to decreasing population density encouraging cotton plants to form more heavy bolls and give the highest yield/plant. The previous reduction in number of open bolls/plant and boll weight at crowded plants on the consideration of unit ground area. The results in the same Tables show that planting two plants per hill at a wider distance (30cm.between hills of 43076 plants/fed.) was found to give the highest values of this character. These results could be explained on the basis that cotton plants grown at wider hill space resulted in low competition between it for nutrient elements, soil moisture and sun light , so that translocation (and consequently accumulation) of metabolites through fruits was increased spacing on seed cotton yield or its components was stated by most workers mentioned in this literature. Similar findings were obtained by Abo-Shetaia *et. al.* (2008) and El-Samad *et. al.* (2008) .However, increasing population density increased of un open bolls/plant in the second season, boll weight in the first season, seed cotton yield and lint yield /fed. In both seasons and lint percentage in the first season. The highest value in this trait was obtained from sowing at (20cm.and 2 plants/hill of 64615 plants/fed.) compared with sowing at (10cm. and 1plant/hill in the same density).The increase in population density compensated the forementioned trends and led to the higher yield/unit area. However, number of total bolls, number of open bolls and boll weight took another trend these results are in harmony with those obtained by Mahdi (2007), El-Samad *et. al.* (2008) and Wrather *et. al.* (2008).

The results in Tables(8and9),it is also clear that increasing N level significantly increased number of unopen bolls and seed cotton yield/plant , average boll weight, seed cotton yield and lint yield /fed. and seed index in both seasons. This may be due to strong the vegetative growth and produced more from bolls/plant with increasing the period of vegetative growth ,plant height, dry weight per plant, number of fruiting branches and boll weight. This result is in harmony with that reported by El-Hindi *et. al.* (2006) Mahdi (2007). Ibrahim (2008) and Molin and hugie(2010).While, adding 45 kg N /fed .was found to give the highest number of open bolls/plant and lint percentage ,as compared to 60 and 75 kg N /fed .these results may be due to increasing infested bolls at higher nitrogen treatment 75 kg nitrogen and resulted in reducing number of open bolls per plant . these results are in agreement with those obtained by Darwish and Hegab(2000),) and El-Hindi *et. al.* (2006).

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تأثير بعض المعاملات الزراعية على النمو وصفات التزهير والتبكيروالمحصول لنباتات القطن صنف جيزة 90

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أقيمت تجربتان حقليتان خلال موسمي الزراعة 2008 و 2009م بمحطة البحوث الزراعية بشندويل– محافظة سوهاج– مركز البحوث الزراعية لدراسة تأثير الكثافة النباتية من خلال توزيع النباتات (10 سم بين الجور مع ترك نبات بالجورة, 20 سم بين الجور مع ترك نباتين بالجورة بمعدل 64615 نبات/فدان) و (15 سم بين الجور مع ترك نبات بالجورة 30 سم بين الجور مع ترك نباتين بالجورة بمعدل 43076 نبات/فدان) وكذالك ثلاث مستويات من التسميد النيتروجينى (45, 60 و 75 كجم ن/فدان) على النمو وصفات التزهير والتبكير لصنف القطنِ جيزة 90.

وكانت أهم النتائج كمايلى:

أدى نقص عدد النباتات في وحدة المساحة وذالك بمعدل (43076 نبات/فدان) الى نقص معنوى فى ارتفاع النبات عند كل الأعمار (75و 105 و135 يوم من الزراعة) فى كلا الموسمين. ولكن زاد معنويا عدد الأفرع الخضرية والثمرية / نبات عند كل الأعمار وكذالك عند الحصادِ في كلا الموسمين، عدد الأوراقِ الخضراءِ / نبات عند عمر 75 و135 يوم من الزراعة فى الموسم الاول وعند عُمر 105يوم في كلا الموسمين، وكذالك زاد الوزن الجاف للأوراقِ والأعضاء المنتجةِ والوزن الجاف الكلى ومساحة المسطح الورقى / نباتِ معنوي بنقص الكثافة النباتية لوحدة المساحة فى كل الاعمار لكلا الموسمين, ما عدا صفة مساحة المسطح الورقى عند عمر 105 في الموسم الأولِ فقط . نقص ارتفاع عقدة اول ثمرى فى كلا الموسمين،تاريخ تفتح اول زهرة فى كلا الموسمين،تاريخ تفتح اول لوزة فى الموسم الاول وفى الموسم الثانى (جم)فى عمر 75و135 والثانى على التوالى،الوزن الجاف /نبات فى الاعمار 105و135فى كلا الموسمين،فى الاعمار 75و135و105و135 فى الموسم الاول والثانى على التوالى، فى عمر 135 فى الموسم الاول ،النسبة المئوية للتبكير وعددالازهار للنبات وكذلك النسبة المئوية لتساقط اللوز فى كلا الموسمين على التوالى . بينما ادت الزراعة على مسافة 15سم بين الجور مع ترك نبات بالجورة (43076 نبات /فدان) الى زيادة معنوية فى عدد الاوراق الخضراء /نبات فى عمر 75 و135فى الموسم الثانى ، الوزن الجاف للاوراق عند عمر 105 وكذلك عند الاعمار 75،135 فى الموسم الاول والثانى على التوالى ،الوزن الجاف للاعضاء المنتجة /نبات فى عمر 75 فى كلا الموسمين ،الوزن الجاف الكلى /نبات فى الاعمار 105و75 فى الموسم الاول والثانى على التوالى ،مساحة المسطح الورقى /نبات فى عمرى 75و105وفى كل الاعمار فى الموسم الاول والثانى على التوالى ،عدد الازهار /نبات والنسبة المئوية لتساقط اللوز فى الموسم االاول . وقد اعطت الكثافة النباتية 64615 نبات

/فدان عند الزراعة على مسافات ضيقة (10سم بين الجور مع ترك نبات بالجورة)وكذلك عند الحصاد ،سجلت الزراعة على مسافة 20سم مع ترك نباتين اعلى القيم.

اعطت زيادة مستوى التسميد النيتروجين حتى 75 كجم ن/فدان إلى زيادة معنوية فى ارتفاع النبات, عدد الأفرع الخضرية والثمرية / نبات، عدد الأوراقِ الخضراءِ والوزن الجاف للأوراقِ (جم) / نبات، الوزن الجاف للأعضاء المنتجةِ والوزن الجاف الكلى / نبات ، مساحة المسطح الورقى / نبات, ارتفاع عقدة أول فرع ثمرى, تاريخ تفتح أول زهرة وأول لوزة, عدد الأزهار و النسبة المئوية لتساقط اللوز في الموسم الثانى. بينما ادت هذه الزيادة الى نقص معنوى فى النسبة المئوية للتبكير فى كلا الموسمين.

كان التفاعل بين الكثافةِ النباتية و معدلات التسميد النيتروجينى غير معنوي فى كل الصفات المدروسة فيما عدا عدد الأفرع الخضرية /نبات عند الأعمار 75 و 105يوم من الزراعة فى الموسم الاول ،الوزن الجاف الكلى /نبات فى العمر 135،ارتفاع عقدة اول فرع ثمرى،عدد الازهار /نبات والنسبة المئوية لتساقط اللوز فى الموسم الاول والوزن الجاف للاوراق /نبات عند الاعمار 75 و 105 ،مساحة المسطح الورقى /نبات فى عمر 105، والنسبة المئوية للتبكير فى الموسم الثانىعدد الافرع الثمرية /نبات عند الحصاد ، عدد الاوراق الخضراء/نبات عند الاعمار 75و 105 ،وتاريخ تفتح اول زهرة فى كلا الموسمين.

بالنسبة للمحصول ومكوناته،ادى نقص عدد نباتات القطن فى وحدة المساحة الى زيادة معنوية فى عدد اللوز المتفتح ومحصول القطن الزهر /ننبات فى كلا الموسمين،وكذلك الى زيادى معنوية لوزن اللوزة بالجرام فى الموسم الثانى .اما بالنسبة لمحصول القطن الزهر والشعر قنطار /فدان فكان للكثافة النباتية تاثير معنوى فى كلا الموسمين،وقد اعطت الكثافة النباتية 64615 نبات /فدان اعلى محصول عند الزراعة على 20سم،وترك نباتين بالجورة،ولقد كان لنقص الكثافة النباتيةتاثير معنوى على نسبة تصافى الحلبج فى الموسمين وكذلك وزن ال100بذرة بالجرام ،وقد اعطت افضل النتائج الكثافة النباتية43076 نبات /فدان عند الزراعة على 30سم بين الجور وترك نباتين بالجورة.اعطت زيادة مستوى التسميد النتروجينى حتى 75 ن/فدان زيادة فى كل من عدد اللوز الغير ممتفتح ومحصول القطن الزهر /نباتومتوسط وزن اللوزة بالجرام فى كلا الموسمين ،وكذلك الى زيادة معنوية فى محصول القطن الزهر ومحصول القطن الشعر/فدان ووزن ال100 بذرة بالجرام فى كلا الموسمين ،كما ادت الزيادة فى التسميد النتروجينى الى نقص معنوى فى عدد اللوز المتفتح /النبات ونسبة تصافى الحليج فى كلا الموسمين ،ادى التفاعل بين الكثافة النباتتية ومعدلات التسميد النتروجينى الى تاثير معنوى فى صفة محصول القطن الزهر /نبات فى كلا الموسمين، ولم يكن لباقى الصفات اى تاثير معنوى نتيجة للتفاعل بين الكثافة النباتية ومعدلات التسميد النتروجينى، وكانت افضل المعاملات هى الزراعة على مسافة 20 سم بين الجور مع ترك نباتين بالجورةِ ومعدلا ت التسميد النتروجينى 75 كجم ن/فدان.