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BEHAVIOR OF SOME COTTON GENOTYPES UNDER TWO GROWING TECHNIQUES

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ABSTRACT: *The obtained of complete winter crops, i.e. clover; wheat and faba bean, the farmers tend to late the cotton planting date. This system led to negatively effect on cotton yield. Therefore, comparing the transplanting technique with the seeding method, we aim to change the strategy of cotton agriculture. Seven genotypes namely, Giza 86; G86 x 10229; Giza 88; Giza 92; Giza 93; [G.84 (G.70 x G 51b)] x S_{62} and Australian were planted by using two methods, seed sowing and two transplanting date(1May and 1June). The earliness % significantly affected by planting methods, as so as the genotypes, while the interaction between them was insignificant for cotton yield. Also, the first fruiting node had the same reaction. The mean performance of early transplanting date 1 May (T_2) exhibited high mean comparing with the late date 1 June (T_3)and seeding method (T_1). On the other hand, the first fruiting node decreases in transplanting method (early and late date) from 7.43 node for seeding method to 5.22 node for early transplanting and 5.95 node for late transplanting methods. However, lint percentage was not affected by the two methods. Early transplanting in first May (T_2) increased seed cotton yield by 1.72 and 2.32 K/F compared with direct seed sowing (T_1) and late transplanting in first June (T_3), respectively.*

Key words: *Cotton- genotypes, transplanting- seedling.*

INTRODUCTION

Sowing date plays an important role in the performance and yield of Egyptian cotton. Late sowing in May has an adverse effect on yield and its components. Also, many growers find it more remunerative to grow some winter crops such as, wheat; faba bean; lentil and more than two cuts of clover before cotton. Continuation of production in cotton cultivation, needs using new agronomic methods which are proper for this plant habits and adaptation. Cotton transplanting, recently is noticed as a new method by major cotton producer countries. It's considered fundamental to successful cotton growing and diversifying the whole farm system both economically and biologically. Delaying sowing date until the end of April or through May or even June , leads to serious reduction in cotton yield. The possibility of retaining the crop productivity by using transplanting instead of late direct seed sowing can solve these problems. Transplanting of cotton could be recommended to increase the area and productivity of winter crops and reduce the cost of production as well as , affording a good controlling of nursery bed against weeds and insect besides reducing the consumption of irrigation water , seedling rate and farming expenses. Abo-Zeid *et al*. (1992) observed that direct sowing on 31 March significantly surpassed the yield of any other treatments (1 May and 15 May), also direct sowing on 1 May resulted in less yield than transplanted seedling 3o days old in both seasons. Yassen (1992) found that the weight of seed cotton per boll was not affected by transplanting procedure or direct planting , whereas Abbas (1981) and Imam (1991) observed that seed cotton yield per plant and per feddan insignificantly increased by transplanting cotton as compared to seed planting . But Bakhit (1965), Abdel-Ghaffar and El-Shinnawy

(1969) and Rawdan (1988), reported that transplanting produced lower yield than direct seed sowing. Using the transplanting system in cotton is important for breeding programs and farmers, because it helps the breeder using the mutation which gives low germination ratio for seeds by using direct seed sowing in field.

Using the system is very important for the farmers because it helps to produce the cotton after the complete season of winter crops (wheat , clover and bean) as well as it gave us decrease the cost for feddan .

Application of this system in general especial in the multiplication fields will be increase progression of the multiplication index from 20 to 80 feddan for direct and transplanting seedling method . The increase of multiplication index lead to the maintains on the Egyptian cotton cultivars from deterioration. In the recent days, there are more off types within the two commercial cultivars (Giza 86 and Giza 88 in general use) therefore, the increase multiplication index help us to cover the cotton area by pure seeds.

There are some strategies to decreasing of adverse effect on cotton yield. One cotton breeders in Egypt pay a great attention to development cultivars adapted to late sowing and give good yields. The other is breeding earlier cultivars or using the transplanting technique to produce more earliness in general use. Therefore, the present work aimed to evaluate this technique for some genotypes to choose the best system with the best genotype.

The present investigation carried out to study behavior of seven genotypes under early and late transplanting and direct seed sowing for yield, yield components and earliness.

MATERIALS AND METHODS

Two field experiments were carried out in Sakha Agricultural Research Station during 2012 and 2013 growing seasons. *Gossypium barbadense* belonging to seven cotton genotypes were used {Giza 86; G86 x 10229; Giza 88; Giza 92; Giza 93; [G.84 (G.70 x G 51b)] x S_{62} and Australian}. The experimental design was a split plot design with three replications. Each plot consisted of 5 rows and 4.5 meter-long. Row spacing and distance among seedlings on rows were 65 cm and 25 cm, respectively.

Seedlings preparation:

Cotton seeds were sown in seedling foam trays (209 cell) which were filled with a mixture of peatmoss: vermiculite (1: 1 v/v), 300 g ammonium sulphate, 400 g calcium super phosphate, 150g potassium sulphate, 50 ml nutrient solution and 50g of a fungicide for each 50 kg of the peatmoss under plastic house.

Field experiment:

This experiments included twenty one treatments which were the combination of 7 genotypes and 2 transplanting dates with seedling of 30 days old in addition to the direct seed sowing in 1 May at the time of transplanting the first date as a control as follows :-

A- Genotypes i.e. Giza 86; G86 x 10229; Giza 88; Giza 92; Giza 93; [G.84 (G.70 x G 51b)] x S_{62} and Australian.

B- Dates of transplanting in addition to direct seed sowing

- (T_1) Direct seed sowing in 1 May at the time of transplanting the first date as a control.
- (T_2) Early transplanting on 1 May with younger seedlings of 30 days old.
- (T_3) Late transplanting on1 June with younger seedlings of 30 days old.

Other cultural practices were done as usual. Treatments were arranged in a split plot design and replicated three times.

The traits studied were:

1- Position of the first fruiting node (F.F.N.).

2- Earliness percentage: was calculated according to the following equation: (weight of seed cotton yield of the first pick / weight of the two picks) X100.

3- Seed cotton yield (k/f): obtained as weight of seed cotton yield (kg.) per plot and

converted to kentar per feddan (kentar = 157.5 k.g).

4- Lint yield: calculated as follows: (weight of seed cotton yield per feddan x lint percentage).

A sample of 50 bolls was harvested at randomly from each plot and was used to obtain plot mean values for:

a- Boll weight in gram: the average weight of 50 bolls in gram.

b- Lint percentage (L.P.): ratio of lint weight to seed cotton weight in the sample expressed as percentage.

c- Seed index (S.I): weight of 100 seeds in grams.

d- Lint index (L.I): weight of lint produced by 100 seeds in grams.

LI = {(SI x LP) / (100- LP)}

Statistical analysis:

A Split- plot design was used in each experiment and the combined analysis conducted for the two seasons. The data collected from the experiment was analyzed statistically according to Snedecor and Cochran (1989) and using Duncan's multiple rang test for comparing means. Analysis was performed by the software Assistat-Statistical Attendance Silva and Azevedo, 2006 and Silva and Azevedo, 2009.

RESULTS AND DISCISSION

The analysis of variance for the genotypes, planting methods, years and the interactions among them are shown in Table 1. The results showed that the differences among cotton genotypes were significant for seed cotton yield/ fed , lint yield /fed., seed index, lint percentage and lint index, while position of the first fruiting node, earliness percentage and boll weight were insignificantly affected. The effect of planting methods was significant for position of the first fruiting node, earliness percentage, seed cotton yield/ fed , lint yield /fed., boll weight, seed index and lint index, while lint percentage was insignificantly affected. However, the first order interaction genotypes by planting methods was insignificant for position of the first fruiting node, earliness percentage, seed cotton yield/ fed , lint yield /fed., boll weight, seed index, lint percentage and lint index. The effect of years was significant for earliness percentage, boll weight, seed index, lint percentage and lint index except for position of the first fruiting node, seed cotton yield and lint yield. Also, the effect of the first order interaction planting methods by years was significant for earliness percentage, seed cotton yield/ fed , boll weight, seed index, and lint index except for position of the first fruiting node, lint yield and lint percentage. While, effect of the interaction genotypes by years was insignificant for position of the first fruiting node, earliness percentage, seed cotton yield/ fed , lint yield /fed., boll weight, seed index and lint index except for lint percentage trait was significant. The second order interaction was significant for position of the first fruiting node, earliness percentage, seed cotton yield/ fed , lint yield /fed., boll weight, seed index, lint percentage and lint index.

Performance of genotypes:

The results in Table 2 and Figure 1 showed that, the effect of genotypes over years and planting methods, clear significant differences among all genotypes for seed cotton yield, lint yield , seed index , lint percentage and lint index . The promising line G86 x 10229 gave the highest performance for cotton yield , seed index , lint percentage and lint index as compared with the other genotypes . On the other hand, the differences among genotypes were found to be insignificant for first fruiting node, earliness % and boll weight, while the rest characters i.e, cotton yield , seed index , lint percentage and lint index , were differed significantly due to genotypes. Also, the results showed that the two genotypes Giza 86, Giza 86 x 10229 and the promising line [G.84 (G.70 x G 51b)] x S_{62} had high yield compared with the other genotypes .

Therefore, using the promising lines G86 x 10229 and [G.84 (G.70 x G 51b)] x S_{62} with Giza 86 in general culture i.e. direct seed sowing are very important to produce the high yield in this experiment.

Table 1

Table 2

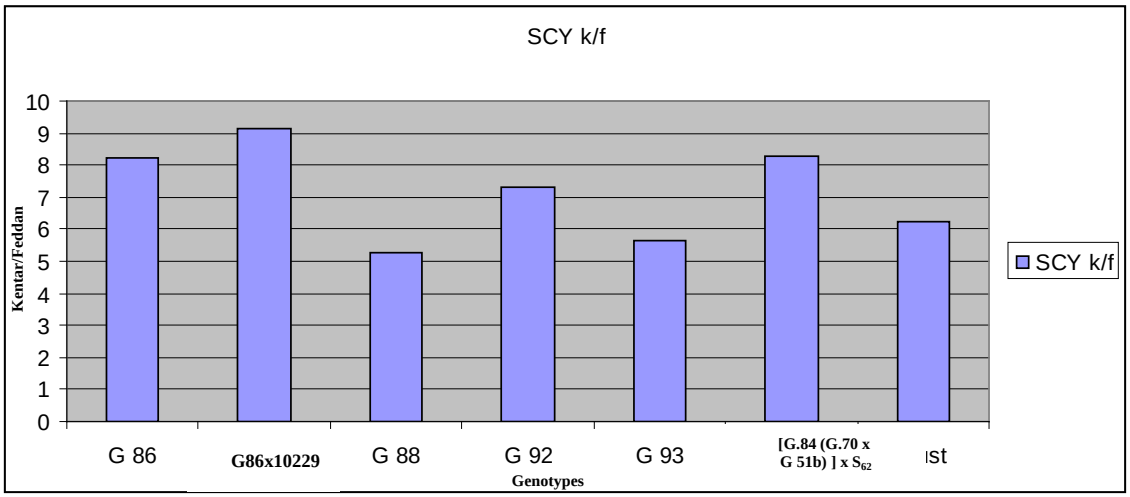

Figure 1. Performance of genotypes for seed cotton yield K/F

Effect of planting methods on the traits studied

The results in Table 3 and Figure 2 showed that, the effect of planting methods had significantly affected first fruiting node and earliness %. The early transplanting (T2) gave the lowest value for first fruiting node . Also, it recorded the highest earliness % compared with late transplanting (T3) and seedling sowing method (T1). The same trend was found by Abbas (1981), who noticed that younger seedlings and early transplanting gave the best result. The results in Table 3 showed that cotton yield was significantly affected by the tested treatments in favor of the early transplanting (T_2) which gave the highest lint yield compared with direct sowing (T_1) and the late transplanting (T_3) but, the direct sowing (seeding) was more yielding (9.05 K/F) compared with transplanting (T3) (7.87 K/F) for lint yield . The same trend was found by Bakhit (1965), Contrary Radwan (1988) and El-Sayed (1992) stated that using younger seedling increased the seed cotton yield per plant but increase obtained was lower than that obtained by direct sowing . Yassen (1995) showed that seed cotton yield per feddan of Giza 75 was affected by both the two involved methods of planting (T_2) Early transplanting and (T_3) Late transplanting.

The obtained results of yield and yield components showed that, late transplanting (T_3) gave high values for boll weight , seed index and lint index .While ,seedling and early transplanting (T_2) gave the lowest values for these traits. On the other hand, no significant differences were obtained for lint percentage among the three treatments (seedling and transplanting dates). Similar results were obtained by Christidis (1962) , Abbas (1981) and Yassen (1992).

Interaction between genotypes with planting methods for all traits studied.

The results in Table 4 showed that, the first order interaction between genotypes and planting methods was found to be insignificant for all traits studied. Although, there was one differences between the performance of genotypes under the three planting methods, but this change of genotypes was regular with all genotypes. Thus, the regular of the effect for genotypes gave insignificant effect for all traits studied.

Insignificant interaction between genotypes and planting methods for seed cotton yield was obtained as shown in Table (1). Similar results were obtained by Yassen (1995) .Also, the high response of most genotypes was found under the first transplanting date (T_2) with regard to seed cotton yield, where the highest values were 10.13, 10.58, 6.33, 8.33, 6.33, 11.01 and 6.74 (K/F) for genotypes G. 86, Giza 86

x10229, G 88, G 92, G 93, [G.84 (G.70 x G 51b)] x S_{62} and Australian, respectively. The lowest values of first fruiting node for all genotypes were resulted from early transplanting (T_2).

Generally , the previous results reported that ,

1- When cotton grown by direct sowing it, gave higher seed cotton yield per feddan (6.77 K/F.) than late transplanting on 1 June (6.17 K/F.). However, early transplanting on 1 May with younger seedlings of 30 days old surpassed direct seed sowing on the same date of transplanting in seed cotton yield per feddan.
2- When cotton grown by transplanting method with early month transplant, it gave higher seed cotton yield per feddan (8.49 K/F.) than late transplanting(6.17 K/F.).
3- The promising line Giza 86 x10229 surpassed the other genotypes in seed cotton yield per feddan under early or late transplanting or late direct seed sowing.

It could be concluded that the highest yield was obtained by direct seed sowing on 1 may (T_1) 8.49 K/F. while, using seeding method gave yield 6.77 K/F.. Due to the early at one month. Also, transplanting on the same time gave yield 6.17 K/F. .

On the other hand, the promising Giza 86 x10229 was more yield comparing with the other genotypes under transplanting method (T_2).

Table 3 : Effect of planting methods on the traits studied (Averagge of two seasons 2012 and 2013).

Planting Method	Position of the first fruiting node (F.F.N)	Earliness, %	Seed cotton yield, k/f	Lint yield, k/f	Boll weight, g	Seed index, g	Lint percentage, %	Lint index, g
T_1 Direct seeding	7.43 a *	58.75 c	6.77 b	9.05 b	2.64 b	8.92 b	40.7	6.18 b
T_2 Early transplanting	5.24 c	64.59 a	8.49 a	10.94 a	2.50 c	8.86 b	40.51	6.08 b
T_3 Early transplanting	5.95 b	61.65 b	6.17 c	7.87 c	2.88 a	9.57 a	40.05	6.43 a

*Means designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.

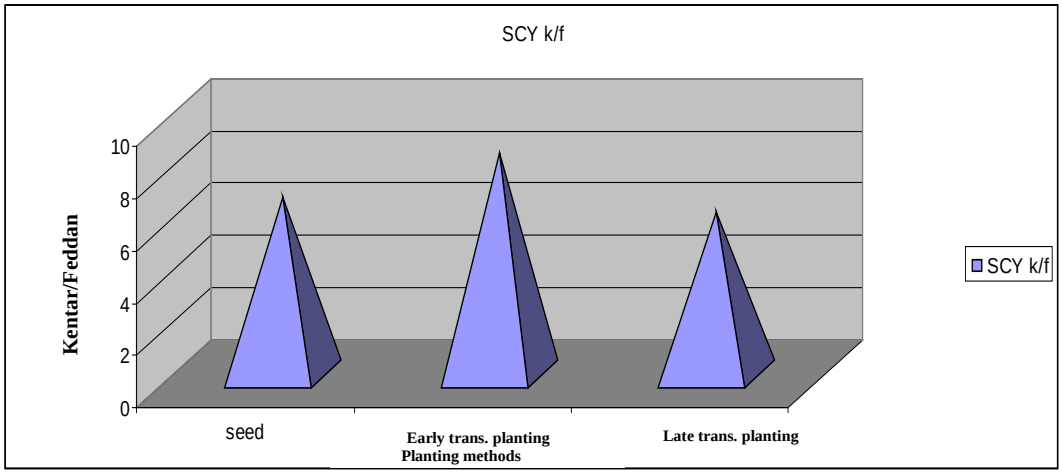

Figure 2. Effect of Planting methods on the seed cotton yield (K/F)

Table 4: Interaction between genotypes by planting methods for all traits studied (Averagge of two seasons 2012 and 2013).

Genotype	Method	Positionofthe first fruiting node (F.F.N)	Earliness, %	Seed cotton yield, k/f	Lint yield, k/f	Boll weight, g	Seed index, g	Lint percentage, %	Lint index, g
Giza 86	Seed(T_1)	7.83	48.44	8.11	11.13	2.84	9.82	42.16	7.16
	Trans.(T_2)	5	76.91	10.13	13.36	2.96	10.39	41.59	7.41
	Trans.(T_3)	5.83	65.85	6.45	8.49	3.01	9.65	41.58	6.91
G86 x 10229	Seed(T_1)	7.17	60.29	9.32	13.41	2.91	10.54	44.39	8.42
	Trans.(T_2)	5.67	64.57	10.58	14.69	2.53	9.61	43.8	7.51
	Trans.(T_3)	6.17	54	7.52	10.06	3.1	10.69	42.14	7.83
Giza 88	Seed(T_1)	8	62.51	4.36	5.73	2.25	8.11	40.21	5.44
	Trans.(T_2)	5.17	57.14	6.33	8.29	2.32	8.16	41.3	5.73
	Trans.(T_3)	5.67	56.56	5.07	6.33	2.75	9.12	39.33	5.93
Giza 92	Seed(T_1)	7.83	56.18	6.76	8.69	2.76	8.85	39.48	5.78
	Trans.(T_2)	5	71.25	8.33	10.36	2.54	8.74	39.19	5.65
	Trans.(T_3)	6.83	68.84	6.79	8.61	2.78	8.96	39.91	5.96
Giza 93	Seed(T_1)	7	59.07	5.06	6.34	2.27	7.68	38.32	4.77
	Trans.(T_2)	5.67	66.04	6.33	7.78	2.03	7.24	38.78	4.59
	Trans.(T_3)	6.17	59	5.46	6.54	2.76	9.4	37.85	5.68
[G.84 (G.70 x G 51b)] x S_{62}	Seed(T_1)	8.17	56.41	7.18	9.82	2.69	8.67	42.08	6.3
	Trans.(T_2)	4.5	59.25	11.01	13.73	2.9	9.74	39.89	6.49
	Trans.(T_3)	5.17	59.61	6.68	8.52	2.9	9.48	40.28	6.43
Australian	Seed(T_1)	6	68.38	6.63	8.26	2.74	8.75	38.27	5.42
	Trans.(T_2)	5.67	56.98	6.74	8.34	2.2	8.11	39.02	5.2
	Trans.(T_3)	5.83	67.7	5.24	6.54	2.85	9.72	39.25	6.27

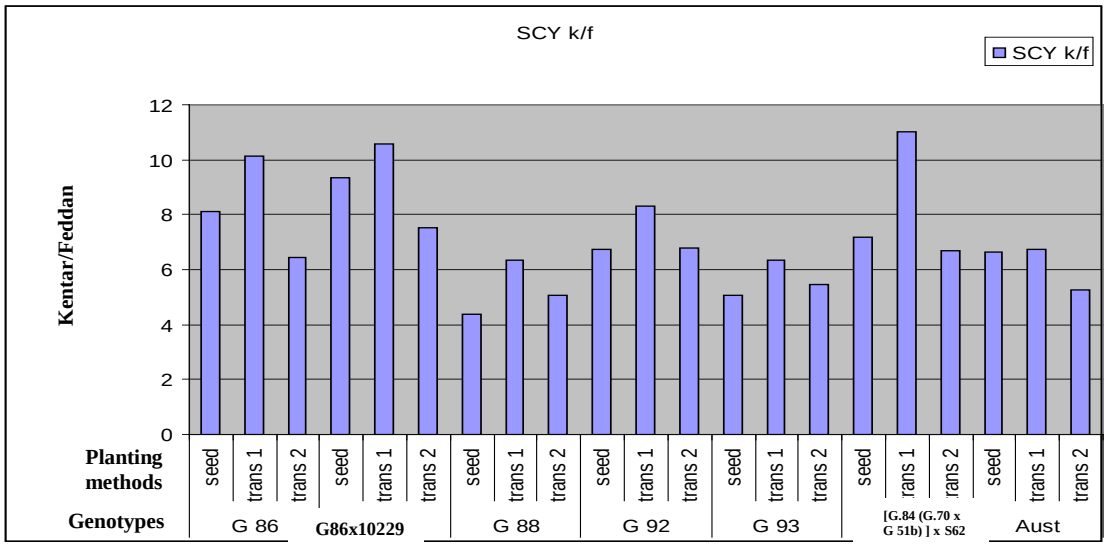

Figure 3: Performance of all genotypes with planting methods (Averagge of two seasons 2012 and 2013).

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سلوك بعض التراكيب الوراثية من القطن تحت طريقتي زراعة

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الملخص العربي

للحصول على محصول شتوي كامل أو زيادة عدد حشات البرسيم أو زراعة القطن عقب محصول القمح يتجة بعض المزارعين الى التأخير فى زراعة القطن وهذا النظام يؤدى الى التأثير السلبى على المحصول لذلك تهدف هذة الدراسة الى مقارنة زراعة القطن بطريقة الشتل (بإستخدام الصواني البلاستيكية) في ميعادي زراعة (١ مايو ٢٠١٢ ، ١ يونيو ٢٠١٣) مع طريقة الزراعة التقليدية بالبذرة بمحطة بحوث سخا لدراسة سلوك بعض التراكيب الوراثية من قطن الباربدنس لمعرفة مدي نجاح زراعتها شتلا بدلا من زراعتها بالبذرة. وقد تم دراسة الصفات التالية: إرتفاع عقدة أول فرع ثمري ، النسبة المئوية للتبكير %، محصول القطن الزهر والشعر (ق/ف) ، وزن اللوزة (جم) ، معامل البذرة (جم) ، معدل الحليج (%) ، معامل الشعر (جم).

ويمكن تلخيص نتائج التحليل التجميعى لموسمى الدراسة فيما يلى:-

١ـ اختلفت التراكيب الوراثية تحت الدراسة فيما بينها معنوياً فى جميع الصفات تحت الدراسة. فيما عدا صفات التبكير ووزن اللوزة . وكانت الأفضلية للتركيب الوراثى جيزة ٨٦ × ١٠٢٢٩

٢ـ اختلفت طرق الزراعة فيما بينها معنويا لجميع الصفات تحت الدراسة فيماعدا صفة معدل الحليج . وكانت الأفضلية للشتل المبكر فى ١ مايو مقارنة بالشتل المتأخر فى ١ يونيو والزراعة بالبذرة

٣. لم يكن للتفاعل بين التراكيب الوراثية وطرق الزراعة تأثير معنوي علي أي صفة من الصفات تحت الدراسة

٤ـ ونظرا لتفوق السلالة المبشرة جيزة ٨٦ × ١٠٢٢٩ علي باقي التراكيب الوراثية في محصولى القطن الزهر والشعر ومعدل الحليج ومعاملى البذرة والشعر لذلك يوصى بادخالها فى الزراعة العامة.

٥. أدى زراعة الحقل بالبذرة مباشرة (الطريقة التقليدية) وزراعة الشتلات عمر ٣٠ يوم في الأرض المستديمة في نفس يوم زراعة البذرة أدي إلي تفوق محصول الشتل علي محصول البذرة بمقدار ١,٧٢ قنطار/ فدان أما في حالة زراعة الشتلات في الأرض المستديمة بعد ٣٠ يوما من زراعة البذرة (زراعة البذور بالصواني في نفس يوم الزراعة التقليدية) فإن محصول البذرة تفوق علي الشتل بمقدار ٠,٦ قنطار/فدان وعموما انخفضت العقدة الثمرية من٧,٤٣ بالبذرة الى٥,٢٤ فى ميعاد الشتل المبكر، ٥,٩٥ فى ميعاد الشتل المتأخر ٠

٦. وعليه ينصح بزراعة الشتلات في حالة التأخير في الزراعة عن الموعد المعتاد لأخذ حشة برسيم زيادة أو الزراعة عقب قمح بالاضافة الى ان الزراعة بالشتل تقلل معدل التقاوي للفدان حيث يتراوح المعدل من ٥ : ٦ كجم / فدان و تقليل الإصابة بالأفات والأمراض الأولية للبادرات وتوفير مياة الرى.

Table 1. Analysis of variance for eight traits for seven cotton genotypes *Gossypium barbadens* grown (Averagge of two seasons 2012 and 2013).

SOV	DF	Position of the first fruiting node (F.F.N)	Earliness, %	Seed cotton yield, k/f	Lint yield, k/f	Boll weight, g	Seed index, g	Lint percentage, %	Lint index, g
Years (Y)	1	0.7937	3127.63**	5.074	14.698	0.77666*	19.8333**	46.013**	23.955**
error a	4	0.29365	35.205	3.4035	5.1085	0.0424	0.5561	0.19175	0.33045
Methods(M)	2	52.4127**	358.02**	60.86**	100.318**	1.56511**	6.6596**	4.728	1.3271*
Y x M	2	0.7937	931.71**	5.792*	4.134	0.5593**	8.6276**	5.695	5.6209**
error b	8	0.74604	32.64	0.8856	1.47175	0.02967	0.4218	2.30938	0.1549
Genotypes(G)	6	1.0688	147	39.896*	93.526**	0.86671	10.9882*	56.422*	18.2098**
Y x G	6	2.164	140.49	5.885	6.758	0.2155	2.5112	8.155*	0.7174
M x G	12	2.6164	311.29	4.137	6.689	0.19677	1.9924	3.644	0.8005
Y x M x G	12	2.3862**	199.9**	4.594**	6.721**	0.36348**	2.2126**	1.897*	0.8274**
error c	72	0.4008	51.82	1.178	2.028	0.03971	0.3123	0.874	0.1798

*and** are significant and highly significant at 0.05 and 0.01 level respectively.

Table 2. Performance of all genotypes for all traits studied (Averagge of two seasons 2012 and 2013).

Genotype	Position of the first fruiting node (F.F.N)	Earliness, %	Seed cotton yield, k/f	Lint yield, k/f	Boll weight, g	Seed index, g	Lint percentage, %	Lint index, g
Giza 86	6.22	63.74	8.23 b *	10.99 b	2.94	9.95 a	41.78 b	7.16 b
G86 x 10229	6.33	59.62	9.14 a	12.72 a	2.85	10.28 a	43.44 a	7.92 a
Giza 88	6.28	58.74	5.25 e	6.79 d	2.44	8.46 d	40.28 c	5.70 d
Giza 92	6.56	65.42	7.29 c	9.22 c	2.69	8.85 c	39.53 d	5.79 d
Giza 93	6.28	61.37	5.62 de	6.88 d	2.35	8.11 d	38.32 e	5.01 e
[G.84 (G.70 x G 51b)] x S_{62}	5.94	58.42	8.29 b	10.69 b	2.83	9.30 b	40.75 c	6.41 c
Australian	5.83	64.35	6.21 d	7.72 d	2.6	8.86 c	38.85 e	5.63 d

*Means designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test.