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Physiological Response of Egyptian Cotton to Some Cultural Practices in Assiut Governorate

M.T. Said; E.M.M. Shalaby, H.M. Abd El-Rahim, and A.Y. Allam
Dept. Agronomy, Fac. Agric., Assiut Univ., Egypt.

Abstract

This study was carried out in the two growing seasons of 2008 and 2009. Five experiments were conducted in each season in the Experimental Agricultural Farm, Faculty of Agriculture, Assiut University. Each experiment represented one planting date. Through each experiment two variables were designed in split-plot design in which time of thinning was allotted in the main plots, whereas splitting NPK was in the sub-plots. The obtained results could be summarized as follows:

1-Total soluble carbohydrates, number of open bolls per plant, weight of seed cotton per boll in gram and Seed cotton yield of Kentar/fed were decreased significantly as planting date was delayed, On the contrary node number of the first sympodium was lowered.

2-The data revealed that thinning before the second irrigation favoured Plant height, total soluble carbohydrates, number of open bolls per plant, weight of seed cotton per boll and Seed cotton yield of March plantings, whereas the reverse was true with regard to the late plantings, i.e., thinning before first irrigation. On the contrary of that node number of the first sympodium was lowered in March plantings.

3-The data revealed that splitting fertilization increased significantly total soluble carbohydrates, number of open bolls per plant, weight of seed cotton per boll and Seed cotton yield. On the contrary of that node number of the first sympodium was lowered.

Key words: Cotton, photosynthesis-respiration relation, planting dates, time of thinning and splitting application of NPK (N_2, P_2O_5 & K_2O).

Introduction:

Cotton is considered one of the most important fiber crops allover the world. Particularly, the Egyptian cotton (*Gossypium barbadense* L.) which is characterized by higher fiber quality such as fiber length, strength, number of fibers/seed and fineness as compared with the other species. For some economical factors occurred in Egypt such as cooperative marketing, high wages of laborers and high prices of cereals when compared with cotton led to a decrease in cotton area. The cultivated area of cotton was decreased from 1,986,631 feddan in 1961 to

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428,591 feddan in 2008 as reported by F.A.O. In addition, the majority of cotton growers have delayed the recommended planting date to take the advantage of cultivating early or late winter crops before cotton. Moreover, the global warming occurred nowadays, which increased the temperature degrees. This phenomenon will increase the respiration rate of plants, which consequently decrease the productivity of most crops specially cotton. In many if not most plants the optimal temperature for photosynthesis is distinctly lower than the optimum for respiration as indicated by Daubenmire (1959).

Thus any increase in temperature degrees will increase oxidation and consequently decrease the accumulation of the total soluble carbohydrates in plants. Because both growth and reproduction depend mainly upon a more rapid rate of accumulation than the oxidation of organic compounds. Then plants will be at a disadvantage when the temperature rises above the optimum for photosynthesis.

Therefore the present research is concerned with studying different planting dates to find the best planting in which temperature degrees are suitable for photosynthesis not oxidation. Here too, the best managements for each planting such as time of thinning and splitting different fertilizers of NPK frequencies are needed. Thus the current study was an attempt to manifest the factors affecting the photosynthesis-respiration relation through each planting date.

Materials and Methods:

This investigation was carried out in the Experimental Agricultural Farm, Faculty of Agriculture, Assiut University, during the two growing seasons 2008 and 2009 to study the physiological response of Egyptian cotton to planting dates, time of thinning and fertilization frequency in Assiut governorate.

The variety used in this study was Giza 90 (*Gossypium barbadense* L.) which is one of the long staple cultivars. The soil of such experiments was clay as presented in table 1.

Table 1. Calcium carbonate (CaCO3) and particle size distribution.

Season	CaCO3 (%)	Particle size distribution (%)			Soil Texture
		Sand	Silt	Clay	
2008	0.88	27.00	30.40	42.60	Clay
2009	1.20	26.46	33.29	40.25	Clay

Table 2. Estimation of the available elements in the soil types.

Season	Total N (%)	Available elements per mg/kg soil					
		K	P	Cu	Fe	Mn	Zn
2008	0.30	296.40	12.00	3.070	14.50	3.51	0.55
2009	0.18	273.00	14.00	3.230	15.46	3.85	0.78

The above analysis was carried out in the Agricultural Research Center Soil, Water & Environment Res. Institute Unit of Analysis & Studies. The land was ridged at about 59 cm apart; i.e. 12 rows for 7.10 m.

The accumulated degrees of temperature were calculated on the base of zero point of growth which was 6.5°C as indicted by Christidis & Harrison (1955).

Table 3. Accumulate temperatures during seasons 2008 & 2009.

Season	March	April	May	June
2008	451.2	526.6	655.5	750.7
2009	333.7	527.7	618.0	754.2

Each season contained five separate experiments represented the five planting dates i.e. 1/3, 15/3, 1/4, 15/4 and 1/5. The variables in each experiment were distributed as split plot design. The variables studied in each planting were time of thinning and splitting of NPK fertilizers.

The first variable was time of thinning which was allotted in the main plots. The treatments were as follows:

1- Thinning after 25 days from planting (Th_1).

2- Thinning after 40 days from planting (Th_2).

The second variable was the fertilization splitting of NPK. This variable occupied the sub-plots. The treatments in this respect were as follows:

1. The recommended doses, i.e. 62, 22.5 and 50 kg/fed. for nitrogen, P_2O_5 and K_2O, respectively. These doses were applied before the second irrigation (Sp_1).
2. Splitting the recommended doses into two equal parts before the second and third irrigations (Sp_2).
3. Splitting the recommended doses into three equal parts before the second, the third and the fourth irrigation (Sp_3).
4. Splitting the recommended doses in to four equal parts before the second, third, fourth and fifth irrigations (Sp_4).

The area of each sub-plot was 17.5 m^2 in each season. Three guarded hills were sampled in each sub-plot represented 6 plants (2 plant/hill after thinning). The characters estimated on all the sampled plants at each sampling date were as follows:

1: Total soluble carbohydrates: were estimated in the dry mater of stem seedling aged 50 days as described by Dubois *et al.* (1956) and Krishnaveni *et al.* (1984).

2: Location of first sympodium on plant main stem.
3: Number of open bolls per plant.
4: Weight of seed cotton per boll.
5: Seed cotton yield in Kentar/fed.: The seed cotton of each split-plot was weighed.

The analysis of variance for a split-plot design was carried out for each studied character in each planting date. The combined analysis for data from the different planting dates was also carried out for each year for all aforementioned characters. The significant means of any studied character were compared using L.S.R. at 5% probability level values were used to compare means according to Fisher (1946).

Results and Discussion

The present paper was concerned with studying the physiological response of Egyptian cotton (*Gossypium barbadense* L.) to planting dates, thinning time and splitting NPK. To achieve the objectives of this study, different traits were evaluated. Moreover, the activity of metabolism of cotton plant under these trials through the net product of photosynthesis and respiration, i.e., estimation the total soluble carbohydrates during the seedling stage of cotton stem. The results obtained for each trait and their discussion could be presented here under the following subheadings:

1:Total soluble carbohydrates

This trait is very important to be estimated because it represents the net result of photosynthesis and respiration (oxidation) in the cotton plants. These physiological processes are affected by the temperature degrees prevailing during the different stages of growth. In this respect Daubenmire (1959) showed that different functions of the same plant have different cardinal temperatures. In many if not most plants the optimal temperature for photosynthesis is distinctly lower than the optimum for respiration.

Therefore, the present results in this respect proved that early sown seedlings were characterized with high level of total soluble carbohydrates (table 4), i.e., consistent decrease in this respect was noted as planting date was delayed in both seasons. This is to be expected since the accumulative degrees of temperature above the zero point of growth were increased as planting date was delayed (table 3). The present results could be explained on the base that by increasing temperature, respiration may increase up to the optimum degree. This in turn, decreased the accumulated carbohydrates as shown before. Therefore, studying the factors affecting photosynthesis–respiration relation is a matter of great importance for crop production. Such findings are in harmony with those obtained by Daubenmire (1959), Mc-Mahon and Low (1972), Shalaby (1972), Yoon *et al*. (2009), Loka and Oosterhuis (2010) and Yeates *et al*. (2010).

Table 4. Total soluble carbohydrates in stem of seedling after 50 days from planting, in mg/gram, as affected by planting date, thinning time and fertilization splitting in 2008 & 2009 seasons.

Planting date / Thinning	1/3		15/3		1/4		15/4		1/5		Mean
2008											
Th_1	58.077	B	48.462	D	37.500	E	26.077	F	14.192	H	**36.862**
Th_2	61.827	A	51.154	C	37.115	E	22.346	G	10.135	I	**36.515**
Mean	**59.952**	**a**	**49.808**	**b**	**37.308**	**c**	**24.212**	**d**	**24.212**	**e**	**36.688**
2009											
Th_1	58.846	B	49.231	D	37.692	E	27.808	F	14.673	H	**37.650**
Th_2	62.346	A	52.692	C	37.596	E	23.058	G	10.519	I	**37.242**
Mean	**60.596**	**a**	**50.962**	**b**	**37.644**	**c**	**25.433**	**d**	**12.596**	**e**	**37.446**

P = Planting dates **a, b, c..** P × TH: A, B, C..

Time of thinning affected significantly the total soluble carbohydrates in the seedling stem (table 4) in both seasons. The data proved that thinning before the second irrigation favoured the total soluble carbohydrates of early sown plants whereas thinning before the first irrigation was recommended for late sown plants. This is rue in the two growing seasons. Therefore, the first order interaction of planting date × time of thinning was significant.

2: Location of the first sympodium on plant main stem:

The results obtained in this respect (table 5) revealed that planting date had a marked effect on the node number of the first sympodium. It tended to be higher as planting date was delayed. The lowest node was obtained from the planting on the first of March. Therefore, the present trend could be explained on the base of that total soluble carbohydrates in the stem of cotton seedlings (table 4) were increased in early plantings. Because both growth and reproduction depend mainly upon a more rapid accumulation than of oxidation of organic compounds. Therefore late sown plants were at disadvantage whenever the temperature above zero point of growth during the early stages of growth raised and consequently may raise the oxidation. In this respect Mc-Mahon and Low (1972) declared that cool whether but not chilling during the seedling stage of cotton growth is required. Shalaby (1972) and Ali and El-Sayed (2001) came to the same conclusion.

Regarding time of thinning, the data exhibited in table 5 revealed that location of first fruiting node reacted significantly to planting date. It was achieved here because the interaction of planting date × time of thinning was significant in the two growing seasons. The data showed that early thinning had an adverse reaction on the early sown plants whereas the reverse was true with regard to late sown. Here it could be recommended the importance of thinning after the appearance of the true leaves not the two cotolydones only. This in turn raised the location of first fruiting node. The present results were in harmony with those obtained by Ziadah and El-Shazly (1998).

With regard to splitting NPK in this respect, the data reported in table 5 revealed that this trial favoured location of first fruiting branch, i.e. lowered the location on the cotton stem. Here, it should be noted that the response of splitting NPK on the location of first fruiting node varied as planting date was changed. This relation was emphasized when the interaction of splitting NPK × planting date was significant in the two growing seasons. It revealed that early sown plants responded very well to splitting fertilizers. The results proved that the rate of response was decreased as planting date was delayed. This could be attributed to the low response of late plantings to fertilizers.

The second order interaction of planting date × thinning date × splitting fertilizer was significant in the two growing seasons. The interaction showed that planting on the first of March and thinning before the second irrigation and splitting the recommended NPK into four doses produced the lowest location of the first fruiting node.

3: Number of open bolls per plant:

The data stated in table 6 explained that planting date affected significantly this trait in favour of early plantings. The maximum number of bolls per plant was obtained by planting on the first of March. This was true in the two growing seasons. Then these values tended to be decreased as planting date was delayed. The present results are to be expected since the location of first fruiting node took the same trend. Here too, the increase in total soluble carbohydrates in the seedling stem of early sown plants encouraged the production of bolls as shown before. The present reactions confirmed by El-Sayed and El-Menshawi (2005) and El-Hindi *et al.* (2006).

Thinning date had a considerable effect in this respect in each planting date (table 6). Here the data emphasized that the effect of thinning time depended mainly on the planting date. Thus the first order interaction of planting date × thinning time turned to be significant in the two growing seasons. The present data are in the same line with those obtained by Ziadah and El-Shazly (1998).

The interaction indicated that thinning before the second irrigation was recommended for plantings during March. For late plantings thinning before the first irrigation was preferable. However, the difference between the two treatments in late plantings was slight.

The data reported in table 6 showed that partitioning NPK had a pronounced effect in this respect in favour of splitting. However, the effect was clear in early sown plants. Thus the interaction of planting date × splitting was

significant in the two growing seasons. The range between Sp1 and Sp4 was 2.3, 2.8, 1.1, 0.5 and 0.5 bolls/plant for Sp1, Sp2, Sp3 and Sp4, respectively in 2008 season. The corresponding differences in 2009 were 1.4, 2.1, 1.5, 0.7 and 0.6 bolls/plant in the same order. It is obvious that late sown plants showed little response to splitting the fertilizers. This is due to the low response of late sown plants to fertilizers.

4: Weight of seed cotton per boll in gram:

Planting date had a pronounced effect on boll weight in the two growing seasons (table 7). The data emphasized a progressive decrease in boll weight as planting date was delayed. The average boll weights in 2008 were 2.51, 2.32, 2.30, 2.09 and 1.92 gm for planting on 1/3, 15/3, 1/4, 15/4 and 1/5, respectively. The corresponding means in 2009 season were 2.68, 2.43, 2.31, 2.12 and 1.91 gm in the same order. The present trend could be ascribed to the higher concentration of total soluble carbohydrates in the stem tissues of early sown seedling (table 4). This in turn may increase the active uptake of anions for such early sown plants. Similar trends in this respect were declared by EI-Sayed and EI-Menshawi (2005) and EI-Hindi *et al.* (2006).

Time of thinning had an important effect on boll weight (table 7). Different responses among the planting dates studied were detected. Therefore the interaction of planting date × time of thinning was significant in the two growing seasons. The interaction revealed that thinning before the second irrigation for March planting could be advisable for late plantings, thinning before the first irrigation favoured boll weight. Here, it could be concluded that thinning must be carried after the appearance of the first true leaf. The present data are confirming with those obtained by Ziadah and El-Shazly (1998).

Average boll weight was reacted significantly to splitting the fertilizers. This is true in the two growing seasons. The data showed that splitting

fertilizers favoured boll weight, i.e. the maximum value in this respect was obtained the recommended fertilizers were split into four doses. Thus, partitioning fertilizers may maximize the benefit of fertilizers. The present data are confirming with those obtained by Srinivasan (2001) and Anjum *et al.* (2007).

5: Seed cotton yield of Kentar/fed.:

The results demonstrated in table 8 illustrated clearly that planting date was an important determiner of seed cotton yield per unit area. The results showed a consistent and significant decrease in such yield as planting date was delayed in the two growing seasons. The average yields of seed cotton in 2008 season were 7.06, 5.68, 4.78, 3.49 and 3.02 kentar/fed. for plantings on 1/3, 15/3, 1/4, 15/4 and 1/5, respectively. The corresponding means in 2009 were 7.46, 5.76, 5.03, 3.81 and 3.27 kentar/fed. in the same order. Therefore the differences in yields per unit area due to various planting could be explained on the fact that early sown plants which led to the highest yields were associated by comparatively lower accumulated temperature prevailing during the early stages of growth as shown before (table 3). This in turn caused the following, a) an increase in the concentration of total soluble carbohydrates owing to the decrease in respiration (table 4). b) The plants to have in their disposal a longer period for flowering and maturity, since the extreme earliness in flowering may cause a disadvantage competition between developing leaves and young fruiting organs and c) decreased the location of the first fruiting node which in turn increased number of fruiting branches/plant (table 5). Therefore, these conditions contributed to as larger increases in number and weight of mature bolls/plant. Thus the present results suggested well that cool weather but not chilling temperatures is required in the early stages of growth, i.e. after thinning and prior to floral initiation are advisable for higher production of seed cotton. In this respect, Daubenmire (1959), Shalaby (1972) declared that both growth

and reproduction depend mainly upon more rapid rate of accumulated of organic compounds oxidation because plants are at a disadvantage whenever the temperature rises above the optimum for photosynthesis. Here, the present trend with regard to yield of seed cotton is to be expected since the vegetative, flowering and yield components took the same trend as shown before in this study. The present results are in general accordance with those obtained by Saleh *et al.* (2004), EI-Sayed and EI-Menshawi (2005) and EI-Hindi *et al.* (2006).

Time of thinning had a considerable and significant effect on yield of seed cotton per unit area (table 8). This is true in each planting date in the two growing seasons. The data proved that thinning before the second irrigation was advisable when sown during March planting. The corresponding values were detected before the first irrigation when sown through April and May i.e. when sowing cotton after winter crop. However, the differences were not significant in the second season with regard to the late plantings. This was achieved since the interaction of planting date × time of thinning proved to be significant in the two growing seasons. The present trend could be ascribed to the low growth of early seedlings which have not true leaves but have the two cotolydons nods of each seedling only. That is before the first irrigation. With regard to the late seedlings, the reverse was true because such seedlings had the true leaves before the first irrigation. The present data are confirming with those obtained by Ziadah and El-Shazly (1998).

Splitting the fertilizers had a marked effect on the yield of seed cotton per unit area as shown in table 8. Here too the response to splitting was varied among the planting dates studied. In general, the response of cotton to splitting was low for late sown plants when compared with early sown ones. The differences in yield between Sp1, i.e. which applied into one dose and Sp4 i.e. splitting into four doses in 2008 season were 1.09, 1.39, 0.66, 0.37 and 0.22 kentar/fed. for plantings on 1/3, 15/3, 1/4, 15/4 and 1/5, respectively. In 2009 the corresponding differences were 0.92, 1.28, 0.45, 0.30 and 0.40 kentar/fed. in the same orders. The results revealed that the response for late sown plants was low. These data are expected since total soluble carbohydrates were decreased as planting date was delayed as shown in table 4. This in turn may decrease the active uptake of anions for such plantings. Therefore, splitting the fertilizers in Egyptian soil could be advisable for some reasons from our point of view as follows:

1- Splitting the fertilizers may decrease the rate of leaching.
2- Splitting fertilizers at different stages of growth is very

important to cotton plant to face the different requirements of fertilizers. This practice could maximize the benefit of fertilizers.

3- The Egyptian soil is tended to be alkali in the presence of calcium carbonate. This salt may change the majority of added nitrogen into ammonia which easily lost. Then splitting may avoid this loss.

The second order interaction of planting date × thinning time × splitting fertilizers was significant in the two growing seasons. The interaction revealed that time of thinning and splitting fertilizers depend mainly on the planting date chosen. Therefore, the maximum yields of seed cotton were 8.14 and 8.09 metric kentar/fed. in 2008 and 2009 seasons, respectively. These yields were obtained from planting on the first of March, thinning before the second irrigation and splitting fertilizers into four doses.

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الاستجابة الفسيولوجية للقطن المصري لبعض المعاملات الزراعية في محافظة أسيوط

السيد محمود محمد شلبي ،حسين محمد عبد الرحيم ،عبد الحاكم يونس علام ، محمد ثروت سعيد
قسم المحاصيل – كلية الزراعة – جامعة أسيوط

أختص هذا البحث بدراسة الاستجابة الفسيولوجية للقطن المصري (جيزة 90) التابع للاقطان طويلة التيلة و الناتج من التهجين بين صنف جيزة 83 و صنف دندرة وذلك لمواعيد الزراعة و مواعيد الخف و تقسيم الجرعة السمادية (نيتروجين و فو2أ5 و بو2أ) في محافظة أسيوط ، وقد أجرى هذا البحث بمحطة التجارب الزراعية بكلية الزراعة – جامعة أسيوط خلال الموسمين الزراعيين 2008 و 2009 ، حيث تضمن كل موسم خمس تجارب منفصلة ممثلة في مواعيد الزراعة (3/1 و 3/15 و 4/1 و 4/15 و 5/1) ، وقد وزعت العوامل الأخرى داخل كل تجربة في تصميم القطاعات المنشقة مرة واحدة ، حيث تم دراسة عاملين هما ميعاد الخف و تقسيم الجرعة السمادية الموصي بها على دفعات ، بحيث وضع عامل ميعاد الخف في القطاعات الرئيسية وكانت مستويات هذا العامل على النحو التالي :

1. الخف بعد 25 يوم من تاريخ الزراعة.
2. الخف بعد 40 يوم من تاريخ الزراعة.

بينما وضع عامل تقسيم الجرعة السمادية (نيتروجين و فو2أ5 و بو2أ) في القطاعات المنشقة ، وكانت مستويات هذا العامل على النحو التالي:

1. إضافة الجرعات الموصي بها (62 و 22.5 و 50 كجم/ فدان على النيتروجين و فو2 أ5 و بو2أ على التوالي) علي دفعة واحدة قبل الرية الثانية.
2. تقسيم الجرعات الموصى بها إلى قسمين متساويين و إضافتهما قبل الرية الثانية والثالثة.
3. تقسيم الجرعات الموصى بها إلى ثلاثة أجزاء متساوية و إضافتها قبل الرية الثانية والثالثة والرابعة.
4. تقسيم الجرعات الموصى بها لأربعة أجزاء متساوية و إضافتها قبل الرية الثانية والثالثة والرابعة والخامسة.

وتم عمل التحليل المشترك لمواعيد الزراعة وذلك في كل موسم علي حده و يمكن تلخيص النتائج المتحصل عليها فيما يلي :

(1) **محتوي سيقان بادرات القطن من السكريات الذائبة الكلية:** أثبتت النتائج أن النباتات المنزرعة خلال المواعيد المبكرة تحتوي على مستوى عال من الكربوهيدرات الذائبة الكلية ثم يتجه التركيز إلي الانخفاض كلما تأخر ميعاد الزراعة، كما وجد أن الخف قبل الرية الثانية في المواعيد المبكرة أدي إلي زيادة محتوي السيقان من السكريات الذائبة الكلية بعكس المواعيد المتأخرة حيث أدي ذلك إلي معنوية التفاعل بين ميعاد الزراعة و الخف.

(2) **ارتفاع أول فرع ثمري علي الساق الرئيسية للنبات:** أشارت النتائج أنه كلما تأخر ميعاد الزراعة أدي ذلك إلي ارتفاع أول فرع ثمري علي الساق

الرئيسية، كما أوضحت النتائج معنوية التفاعل بين ميعاد الزراعة و ميعاد الخف حيث وجد اتجاه عكسي بين مواعيد الزراعة المبكرة و مواعيد الزراعة المتأخرة في هذا الصدد حيث أظهرت النتائج التأثير السلبي للخف المبكر علي مواعيد الزراعة المبكرة بعكس مواعيد الزراعة المتأخرة ، كما أوضحت النتائج معنوية كلا من تفاعل ميعاد الزراعة مع تقسيم الجرعة السمادية خلال موسمي الزراعة كما أثبتت النتائج انخفاض معدل الاستجابة لتقسيم التسميد كلما تأخر ميعاد الزراعة ، وكان تفاعل الدرجة الثانية بين ميعاد الزراعة و ميعاد الخف و تقسيم الجرعة السمادية معنويا خلال موسمي الزراعة.

(3) **عدد اللوز المتفتح لكل نبات:** تم الحصول علي اكبر عدد من اللوز المتفتح عند الزراعة في الميعاد المبكر (أول مارس) ، كما كان التفاعل بين ميعاد الزراعة وميعاد الخف معنويا حيث اظهرت البيانات زيادات معنوية في متوسطات عدد اللوز/نبات عند الخف قبل الرية الثانية في المواعيد المبكرة بعكس المواعيد المتأخرة التي ظهرت فيها زيادات طفيفة عند الخف قبل الرية الأولي ، وكان تأثير تقسيم الجرعة السمادية معنويا وواضح في مواعيد الزراعة المبكرة بالمقارنة في حاله الزراعات المتأخرة ، كما كان التفاعل بين ميعاد الزراعة و تقسيم الجرعة السمادية معنويا خلال موسمي الدراسة.

(4) **وزن القطن الزهر لكل لوزة بالجرام:** تأثرت هذه الصفة معنويا بميعاد الزراعة خلال موسمي الزراعة ، حيث أدي التأخير في ميعاد الزراعة إلي نقص ملحوظ في متوسط وزن اللوزة بالجرام ، كما وجد أن الخف قبل الرية الثانية في زراعات مارس يؤدي إلي زيادة وزن اللوزة وذلك علي عكس الزراعات المتأخرة و التي يوصي فيها بالخف قبل الرية الأولي ، وأوضحت التجربة التأثير المعنوي لتقسيم الجرعة السمادية علي متوسط وزن اللوزة خلال موسمي الزراعة حيث أن اعلي قيمة تم الحصول عليها بتقسيم الجرعة السمادية الموصي بها من نيتروجين و فوسفور و بوتاسيوم علي أربعة مرات.

(5) **وزن القطن الزهر بالقنطار/فدان:** أظهرت النتائج انخفاضاً ملحوظاً في المحصول و ذلك بالتأخر في ميعاد الزراعة خلال موسمي الزراعة ، و أثبتت النتائج أن النباتات المنزرعة خلال شهر مارس و التي تم الخف بها قبل الرية الثانية أعطت محصول قطن زهر أعلي من تلك النباتات التي تم الخف بها قبل الرية الأولي علي عكس المواعيد المتأخر التي كان يستحسن بها الخف قبل الرية الأولي و التي لم يكن لها استجابات معنوية بالمقارنة باستجابات المواعيد المبكرة ، وكان لتقسيم الجرعة السمادية تأثيرا معنويا علي صفة المحصول حيث استجابت المواعيد المبكرة لتقسيم الجرعة السمادية معنويا و بصورة اكبر من استجابة المواعيد المتأخرة لتقسيم الجرعة السمادية ، ولوحظ معنوية التفاعل الثلاثي بين ميعاد الزراعة و ميعاد الخف و تقسيم الجرعة السمادية و التي أعطت أعلي قيم وهي 8.14 و 8.09 قنطار متري/ فدان من معاملة الزراعة في أول مارس و الخف عند الرية الثانية و تقسيم الجرعة السمادية علي أربع دفعات وذلك خلال موسمي الزراعة 2008 و 2009 علي التوالي.