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Effect of Planting and Harvesting Dates on the Physiological Characteristics of Cotton-Seed Quality

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ABSTRACT

Cotton is grown intentionally for fiber and oil, so that cotton-seed quality has economic importance for its products quality. Data about cotton-seed quality is limited. Experimental carried out during 2020-2021 seasons at Mallawi Research Station, Plant Physiology Department, Cotton Research Institute, Agricultural Research Center, Egypt, using Giza-95 variety to evaluate planting date effect and picking time on cotton-seed quality properties (seed volume, seed density, immaturity, inhibition rate%, germination rate%, cleanness%, impurities% and agricultural values), cotton-seed chemical contents (oil%, protein%, nitrogen%, carbohydrates% and moisture%), yield and its components (opened number boll/plant, boll weight, seed index, lint% and yield/k/f) and fiber quality properties (fiber length, uniformity index, micronaire reading and fiber strength). Experimental was split-plot design by three replications, main plots were planting date (early and late) and subplots were picking time (first and second). Results revealed that, early planting and picking time effected significantly on cotton-seed quality properties, cotton-seed chemical contents, yield, its components, and fiber quality properties in tested-seasons, which early planting date treatment with first picking gave best values in tested-seasons compared to other treatments that relative to allow plants to normal physiological phase shifting and healthy development that led to harvest in suitable time of field environmental conditions (temperature and humid) then, due to ensure high quantity and quality of cotton-seed. This study recommends that, using cotton-seeds from 1st picking for early planting date as planting cotton-seeds in following seasons for gave highest seed-quality, germination%, growth, and improve productivity of cotton-yield.

Keywords: Cotton-seed quality, chemical contents, planting date, picking time.

INTRODUCTION

Using high quality cotton-seed is an important factor for good germination and establishing stands. Over the last many years, producers checked the cost and benefit of many new cotton varieties. The increasing of cotton production cost and using new planting equipment's, many producers decrease seeding rates, so that it is importance to planting high quality cotton-seed. Growers have planted conventional cotton varieties and saved seed for planting in next season. Environmental conditions, immature and infected cotton-seed are decreased seed quality and germination rate, so producers advised that to improve the quality of cotton-seed production and evaluate cotton-seed quality before planting season by using procedures such as seed quality properties, measuring the seed chemical contents. Wheeler *et al.* (1997) and Hamed *et al.* (2017) noted that using poor planting seed quality due to reduce cotton yield which unstable stand stabilization connected directly with germination and emergence. Also Shakr *et al.* (2017) reported that cotton seed quality is important character that effected on the cotton cultivars performance and production under different environments. Optimum planting time lets genotypes to give maximum potential express and enhance the sensitivity of crop against diseases and pest (Farooq *et al.*, 2011). Cotton has grown in the hot months as May and June, which having maximum daily temperature around >40°C and humidity that due to adverse effects on seedling emergence and establishment (Nawaz *et al.*, 2013 and Yuksel *et al.*, 2013). Early planting date is associated positive with genotype agronomic characteristics expression like more plant height, inter node length, more number of fruiting branches, more number of bolls , high seed index and yield (Hussain *et al.*, 2007). Temperature plays role in commanding growth and developmental stages of cotton plant, which high night temperature is the main environmental factor due to reduce cotton yield that resulted to increase respiration and reduce leaf adenosine tri phosphate (ATP) levels and leaf carbohydrate content (Loka and Oosterhuis, 2010). Elayan *et al.* (2015) and Omar *et al.* (2018) observed that the relation between numbers of opened bolls/plant, boll weight and seed cotton yield/fed, were significant with air temperature and heat units. At harvesting stage exposure bolls after maturity to humid weather may be detrimental for physiological cotton seed quality. Late harvesting date have higher moisture which speeds cotton seed deterioration that lower the germination, make seed highly sensible to mechanical damage and infected by insect pest during seed processing and storage (Jyoti and Malik, 2013 and Kamran *et al.*,2017).

The present study aimed to evaluate the cotton-seed quality properties, cotton-seed chemical contents, yield and fiber propertiesof Giza 95 cultivar with planting date and pickingtimes during 2020 and 2021 seasons.

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MATERIALS AND METHODS

The field experiment was conducted in two summer seasons 2020 and 2021 at Mallawi Research Station of Plant Physiology Department, Cotton Research Institute, Agricultural Research Center, Egypt. A split plot design with three replications was divided to the main plots were planting date (early and late) and the sub-plots were picking time (first and second)to study the effectof planting and harvesting dates on the physiological characteristics of cotton seed quality. Seeds of cultivar Giza 95 were sown in clay loam soils on 24th April for early date and on 29th May for late date in 2020 season and on the 28th April for early date and 1st June for late date in 2021 season. Seedlings were thinned at 2 plants/hill and standard agricultural practices were followed throughout the growing seasons. Representative soil samples were taken from the experimental sites before sowing in two seasons and were prepared for analysis, according to Rebecca (2004). The results of the soil analysis are shown in Table 1.

Table 1. Chemical properties of experimental soil during 2020 and 2021 seasons

2020		2021	2020		2021
pH	8.09	8.14	Soluble anions (meq/l)		
E.C. (dsm^{-1})	1.32	1.36	CO_3^{2-}	--	--
Available minerals (mg/Kg soil)			HCO_3^-	1.24	1.00
N	55.73	57.42	Cl^-	2.27	2.00
P	12.65	15.89	SO_4^{2-}	0.73	0.60
K	504.28	537.53	Soluble cations (meq/l)		
Cu	9.35	9.68	Ca^{2+}	1.68	1.53
Fe	37.62	38.25	Mg^{2+}	0.69	0.62
Mn	9.48	10.06	Na^+	1.45	1.21
Zn	13.85	15.17	K^+	0.34	0.26

All samples were taken randomly from each plot in order to study the following traits:

1- Cotton-seed quality properties:

Seed volume (cm^3) determined by the cubic displacement of 100-seed sample thought methanol in a graduated cylinder according to Leffler and Williams (1983).

Seed density (g/cm^3) calculated by seed-mass per volume.

Immature seeds determined by the floating seeds from the basis of a random sample of 100-seed in methanol bath were counted and classed as immature seeds according to Turner *et al.* (1976).

Inhibition rate measured by using selected 100-seed as a sample from each treatment and weighted them, incubated 24 hours in water, then removed from water, blotted free of surface moisture and weighted again, inhibitions rate calculated by the following equation:

Inhibition% = (Seed weight after incubation in water – dry seed weight/dry seed weight) x 100.

Germination rate is the mean germination time in days and it valued by using the daily number of seeds germination. Cleanness %calculated by taking 300 grams seed randomly to determine how much of material in samples pure seed. Impurities have low quality seeds, insect infected seeds and broken seeds (Quisenberry and Gipson, 1974). Impurities separated and the pure seeds weighted and expressed as a percentage by weight of the all sample.

Impurities% calculated by the equation as follows:

Impurities% = 100 - Cleanness%

Agricultural values ofseedcalculated by theequation as follows:

Agricultural values = (Germination index x Cleanness%)/100

2- Chemical analysis of cotton seeds:

Seed contents of oil, carbohydrate and moisturedetermined according to the method of AOAC (1975).

Also, total nitrogen determined according to micro-Kjeldahl method as reported in AOAC (1975). The crude proteins were calculated by multiplying 6.25 in total nitrogen content.

3- Yield and its components:

Yield and its components were recorded as including the number of opened boll/plant, boll weight, seed index, lint% and yield (k/f).

4- Fiber quality properties:

Fiber length, uifomity index, micronaire reading and fiber strength were recorded during data collection.

5- Heat units:

Monthly air temperature, relative humidity % and conjugated heat units were monitored from Department of Meteorology, Agricultural Research Center as shown in Table (2). These measurements were recorded monthly during the cotton growing season (April - October) in 2020 and 2021 seasons. Heat units (HU) calculated according to Sutherland (2012) equation as follows:

HU = mean daily temperatures – K (Zero growth = 15.6°C)

6- Statistical analysis:

All data were statistically analyzed according to the technique of analysis variance (ANOVA) for the split plot design as published by Gomez and Gomez (1984) by mean of MSTAT-c computer software package. The treatment means were compared using the least significant deference (LSD) at 5% level of probability according to the procedure outlined by Snedecor and Cochran (1990).

Table 2. Monthly maximum, minimum, mean temperature relative humidity and heat units in Mallawi station during 2020 and 2021 seasons.

Months	2020					2021				
	Max ºC	Min ºC	Mean Temp.	Heat units	RH%	Max ºC	Min ºC	Mean Temp.	Heat units	RH%
April	29.2	20.0	24.6	270.0	78.8	28.46	18.67	23.56	238.8	78.05
May	32.6	22.3	27.4	356.4	78.9	31.28	21.75	26.51	327.3	78.64
June	37.8	27.1	32.4	506.7	82.3	36.99	26.82	31.90	489.0	81.77
July	39.9	31.0	35.5	597.6	82.7	39.14	30.91	35.02	582.6	82.18
August	41.8	32.6	37.2	648.9	84.2	40.76	31.64	36.20	618.0	82.96
September	35.3	26.8	31.0	462.3	70.4	34.63	25.75	30.19	437.7	69.63
October	30.7	23.6	27.1	347.4	66.7	29.85	21.68	25.76	304.8	63.25

RESULTS AND DISCUSSION

1- Cotton-seed quality properties:

Results in Table 3, inducted that the planting date effected significantly in cotton-seed quality properties (seed volume, seed density, immaturity, inhibition rate, germination rate, cleanness %, impurities % and agricultural values) in seasons 2020 and 2021, which sowingat early date increased significantly all seed quality properties as compared to late sowing date in both seasons. That might be attributed to early planting date allowed cotton plants to normal physiological phase shifting that

led to product healthy and free infection seed and finally increased seed quantity and quality. However, planting at late date have been under extreme temperature and humidity conditions on cotton plant productivity phases that increased boll shedding, immature boll and infection boll that due to decreased all seed quality properties.

Data in Table 3, cleared that picking time affected significantly, which first picking time increased significantly all seed quality properties except seed density did not affect significantly as compared to second picking time in both seasons.

The interaction between planting date and picking time affected significantly in all seed quality properties except seed density did not affect significantly in 2020 and 2021 seasons as showed in Table 3. Early planting date and first picking time treatment gave the highest values of seed quality properties as compared to other treatments that may be related to early sowing date get healthy plant growth and allowed seed its normal physiological changes and development, also first picking time get the best and healthy bolls in cotton plant that led to increase seed quality as compared to second picking and late planting date. Similar trend was reported by Hamed *et al.* (2017), they found that early planting date have the best results of seed quality properties cotton-seed yield, seed index, seed volume seed density, cleanness %, germination index, inhibition rate and agricultural values, while it have low valuesof impurities % and immaturity as compared with late planting date. late planting date grew cotton plants faster than early planting date, which higher temperature under late planting conditions enhanced growth but with low yield and quality.

Table 3. Effect of planting date and picking time on quality cotton-seeds properties during 2020 and 2021 seasons

Planting date	Picking time	Seed volume (cm^3)		Seed density (cm^3/g)		Immaturity		Inhibition rate %		Germination rate %		Cleanness %		Impurities %		Agricultural values	
(A)	(B)	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Early date	First	9.75	10.22	0.98	0.99	14.75	12.86	57.26	59.69	92.84	96.25	93.65	95.18	6.35	4.82	87.22	91.85
	Second	9.54	9.83	0.98	0.99	16.77	14.51	56.85	58.64	90.73	93.42	90.72	92.43	9.28	7.57	82.54	86.91
Mean		9.64	10.02	0.98	0.99	15.74	13.68	57.05	59.16	91.78	94.83	92.18	93.80	7.81	6.19	84.88	89.38
Late date	First	8.96	9.17	0.98	0.98	17.98	16.32	50.43	52.38	87.61	89.13	87.44	89.26	12.56	10.74	76.95	79.72
	Second	8.42	8.99	0.97	0.97	19.02	17.45	47.92	49.55	85.42	86.94	85.36	87.52	14.64	12.48	73.38	76.48
Mean		8.69	9.08	0.97	0.97	18.50	16.88	48.67	50.96	86.51	88.03	86.40	88.39	13.60	11.61	75.16	78.10
Generally of (B)	First	9.35	9.69	0.98	0.98	16.36	14.59	53.84	56.03	90.22	92.69	90.54	92.22	9.45	7.78	82.08	85.78
	Second	8.98	9.41	0.97	0.98	17.89	15.98	51.88	54.09	88.07	90.18	88.04	89.97	11.96	10.02	77.96	81.69
LSD 0.05	$A_{t\ test}$	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
	$B_{t\ test}$	**	**	NS	NS	**	**	**	**	**	**	**	**	**	**	**	**
	AB	0.343	0.060	NS	NS	0.155	0.102	1.464	0.966	1.045	1.138	1.341	0.716	1.121	1.688	1.144	1.188

2- Cotton-seed chemical contents:

As results stated in Table 4, the oil, protein, carbohydrate and moisturepercentages were increased significantly in the early planting date as compared to late planting date, but nitrogen percentages affected insignificantlyin both seasons 2020 and 2021. The different in cotton-seed contents of oil, protein and carbohydrate related to genotype and environmental conditions, which the daily minimum temperature at 22-23°C was suitable for cotton-seed accumulations of oil and protein. Also, high shade light improved the oil accumulation, while overly high or overly low shade light limited protein accumulation (Lü *et al.*, 2013). Sowing date affected on cotton growth and development by temperature, humidity and light.Early sowing date increasedseed total photo-assimilates (lipids), which timely sowing plants allowed them to complete produced mature seeds, hale from aborted seeds and identified with healthy seeds and have high content of oil, protein, nitrogen, carbohydratepercent. However, late sowing date led to grow cotton plants at extreme temperature, humidity and light, which increased respiration rate and decreased sucrose export to leaves, causing that less carbohydrate transferred to cotton-seed and decreased seeds contents oil, protein and nitrogen (Wei *et al.*, 2017). Also, Chen *et al.* (2015) illustrated that embryo content of oil and protein reduced significantly with late planting dates as compared with early planting dates. Accumulation of oil in embryo was most sensitive than accumulation of protein in response to planting date, temperature and light, which they are the mainly factors for oil accumulation.Likewise, Liu *et al.* (2015) illustrated that environmental conditions differences between normal and late planting date were mainly on temperature and humidity, and late planting significantly reduced cotton-seed properties.

Table 4. Effect of planting date and picking time on percentages of oil, protein, nitrogen, carbohydrate and moisture in cotton-seeds during 2020 and 2021 seasons

Planting Date (A)	Picking time (B)	Oil %		Protein %		N%		Carbohydrate %		Moisture %	
		2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Early date	First	22.54	23.86	25.04	25.23	3.96	3.98	24.83	25.62	12.42	12.92
	Second	22.12	23.42	24.87	25.05	3.88	3.91	24.59	25.35	12.56	12.85
Mean		22.33	23.64	24.95	25.14	3.92	3.94	24.71	25.48	12.53	12.88
Late date	First	21.64	22.73	24.64	24.82	3.82	3.87	23.62	24.47	11.98	12.27
	Second	21.41	22.53	24.39	24.51	3.75	3.83	23.45	24.18	11.76	12.01
Mean		21.52	22.63	25.51	24.67	3.78	3.85	23.53	24.32	11.87	12.14
Generally of (B)	First	22.09	23.29	24.84	25.03	3.89	3.92	24.22	25.04	12.20	12.59
	Second	21.76	22.97	24.63	24.78	3.81	3.87	24.02	24.76	12.20	12.43
LSD 0.05	$A_{t\ test}$	**	**	**	**	**	**	**	**	**	**
	$B_{t\ test}$	**	**	**	**	**	**	**	**	**	**
	AB	0.181	0.171	0.055	0.187	NS	NS	0.037	0.035	0.022	0.017

In Table 4, the first picking time increased significantly on all cotton-seed chemical contents except nitrogen percentage affected insignificantly as compared to the second picking time in both seasons 2020 and 2021.

Data in Table 4, showed that the interaction between planting date and picking time affected significantly cotton-seed chemical contents (oil, protein, carbohydrate and moisture) except nitrogen percentage affected insignificantly in both seasons, which the best

results gave with early planting date and first picking time as compared to the other treatments, which the accumulation of oil, protein, nitrogen and carbohydrate were faster with early planting date, which the temperature effected on the different planting dates changing the seed dry matter dynamic accumulation (Omar *et al.,* 2018).

3- Yield and its components:

Data in Table 5, cleared that the early planting date increased significantly of yield and its components (number of open bolls/plant, boll weight, seed index, lint % and yield), as compared to late planting date in 2020 and 2021 seasons. That may be related to the daily temperature, relative humidity % and conjugated heat units received to cotton plants in early planting date were more suitable than late planting date (Table 1), which optimum heat units allowed cotton plants to secure high amount of carbohydrate content that improve plant productivity, yield and quality (Hussain *et al.,* 2007), however high night temperature during late planting date increased plant respiration rate that reduced leaf carbohydrate content that decrease plant growth and finally reduced yield and its components (Loka and Oosterhuis, 2010 and Omar *et al.*, 2018). Similarly, Awan *et al.* (2011) noticed that 25th April have optimum temperature (26ºC) which had a suitable planting time for cotton to germinate seed, early emergence and high emergence count.Early sowing and genotype of cotton linked with more plant height, more boll weight, more number of fruiting branches, early blooming, high seed index and seed cotton yield.

Results in Table 5, illustrated that first picking increased significantly yield and its components as compared to second picking in both seasons. That might attributed to the high cotton seed quantity found during middle October, which harvesting during this times the relative humidity of field environment is suitable for seeds. So that the optimum temperature for cotton planting is from March to Aprilthat ensure plants to normal physiological phase shifting, increase resistance for insect infection and harvesting during warm and humid weather for ensuring high quantity and quality of cotton-seed (Kamran *et al.,* 2017).Harvesting time also noted significantly importance in cotton seed quality, which cotton-seed picked in September and October with good quality and surface maximum germination potential (Deho *et al.,* 2012).

The interaction between planting date and picking time increased significantly of yield and its components (number of open bolls/plant, seed indexand yield), while boll weight and lint % affected insignificantly as compared to late planting date in 2020 and 2021 seasons, which early planting date and first picking get the highest values as compared to other treatments in both seasons. Thatmight be related to exposure cotton plants at earlygrowth stages to relatively lower night temperature increases flowering stage early and get the yield to harvest in suitable time. However, late planting date exposed cotton plant to extreme temperature and heat units that due to increase growth but gave low yield characters and decrease yield. These results are in line with Boquet *et al.* (2003), Kamran *et al.*(2017) and Omar *et al.*(2018).

4- Fiber quality properties:

As cleared in Table 5, the fiber quality properties (fiber length, uniformity index, micronaire reading and fiber strength) effected significantly by the early planting date as compared to late planting date in 2020 and 2021 season. That might be related to high temperature during growth and fiber development stages, which late planting date due to little increase in fiber length as compared with early planting date. Also, hot climate will have a higher micronaire values due to the thicker rings of cellulose that are deposited daily in fiber. These results are in line with Elayan *et al.* (2015) and Omar *et al.* (2018).

In Table 5, the first picking time affected insignificantly in the fiber quality properties, expect uifomity index increased significantly as compared to the second picking time in both seasons.

Date in Table 5, showed that the interaction between planting date and picking time affected insignificantly in the fiber quality properties, expect uniformity index increased significantly in 2020 and 2021 seasons, which early planting date and first picking get the highest values as compared to other treatments in both seasons. That might related to the qualities of cotton-seed and fiber were the co-estimation characteristics, so that the optimum quality seed in the early stage ensured improvement of fiber. These results are in agreement with Li *et al.* (2009) and Omar *et al.* (2018).

Table 5. Effect of planting date and picking time on yield, its components and fiber properties of cotton-seeds during 2020 and 2021 seasons

Planting Date (A)	Picking Time (B)	No. of opened bolls/plant		Boll weight (g)		Seed index (g)		Lint %		Cotton seed Yield (k/f)		Fiber length (mm)		Uniformity index (%)		Micronaire reading		Fiber strength	
		2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Early date	First	13.16	13.71	2.83	2.86	9.85	9.96	39.82	39.61	8.55	8.71	30.84	30.89	84.81	84.86	4.42	4.47	10.64	10.73
	Second	12.52	12.92	2.72	2.76	9.48	9.71	39.97	39.84	7.56	7.94	30.85	30.90	84.76	84.82	4.41	4.42	10.61	10.66
Mean		12.84	13.31	2.77	2.81	9.66	9.83	39.89	39.72	8.05	8.32	30.84	30.89	84.78	84.84	4.41	4.44	10.62	10.69
Late date	First	11.23	11.56	2.48	2.52	8.79	9.05	40.06	39.99	6.20	6.47	31.01	31.57	84.31	84.38	4.55	4.58	10.50	10.54
	Second	10.40	10.63	2.41	2.47	8.66	8.92	40.15	40.07	5.56	5.86	31.43	31.59	84.32	83.27	4.56	4.55	10.48	10.53
Mean		10.81	11.09	2.44	2.49	8.72	8.98	40.10	40.03	5.88	6.16	31.25	31.58	84.31	83.82	4.55	4.56	10.49	10.53
Generally of (B)	First	12.19	12.63	2.65	2.69	9.32	9.50	39.94	39.80	7.37	7.59	30.96	31.23	84.56	84.62	4.48	4.52	10.57	10.63
	Second	11.46	11.77	2.56	2.61	9.07	9.31	40.06	39.95	6.56	6.90	31.14	31.24	84.54	84.04	4.48	4.48	10.54	10.59
LSD 0.05	$A_{t\ test}$	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
	$B_{t\ test}$	**	**	**	**	**	**	**	**	**	**	NS	NS	**	**	NS	NS	NS	NS
	AB	0.093	0.090	NS	NS	0.086	0.074	NS	NS	0.219	0.105	NS	NS	0.025	0.171	NS	NS	NS	NS

Recommendation:

The study recommends that, using cotton-seeds from the first picking for early planting date as planting cotton-seeds in the following seasons because they are gave the highest seed quality, germination percentage, growth, and finally improve the productivity of the cotton yield.

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تأثير مواعيد الزراعة والجني علي الصفات الفسيولوجية لجودة بذور القطن

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معهد بحوث القطن - مركز البحوث الزراعيه - الجيزه – مصر

يزرع نبات القطن بغرض الحصول على الألياف والزيت، لذلك جوده تقاوي بذور القطن ذات أهمية اقتصادية لضمان جوده منتجاتها و الدراسات والبيانات الخاصة بجودة تقاوي بذور القطن محدوده ، لذا أجريت التجربة خلال موسمي ٢٠٢٠ و ٢٠٢١ لصنف جيزة ٩٥ بمحطة بحوث ملوي بقسم الفسيولوجي التابعة لمعهد بحوث القطن – مركز البحوث الزراعية لتقييم تأثير ميعاد الزراعة والجني علي صفات جودة بذور القطن (حجم البذور- كثافة البذور- البذور الغير ناضجة - معدل التشرب - % الإنبات - % النظافة - % الشوائب - القيمة الزراعية) والمحتويات الكيميائية لبذور القطن (% الزيت - % البروتين - % النيتروجين - % الكربوهيدرات - % للرطوبة) والمحصول ومكوناته (عدد اللوز المتفتح/نبات - متوسط وزن اللوزه - وزن ١٠٠ بذرة - % الشعر- المحصول ق/ف) وصفات جودة الألياف (طول الألياف - إنتظام الطول - قيمة الميكرونير- قوة الألياف). إستخدم تقييم القطع المنشقة مرة واحدة في ثلاث مكررات ، حيث احتوت القطع الرئيسية على مواعيد الزراعة (ميعاد مبكر- ميعاد متأخر) وكانت القطع الفرعية على مواعيد الحصاد (الجنية الأولي – الجنية الثانية). أوضحت النتائج المتحصل عليها أن مواعيد الزراعة وقت الجني كان لها أثر معنويا علي صفات جودة بذور القطن ومحتوياتها الكيميائيه وكذلك المحصول ومكوناته وصفات جودة الألياف في كلا الموسمين ، حيث أعطت معاملة الزراعه في ميعاد مبكر والجنيه الاولي لها أفضل النتائج مقارنة بباقي المعاملات. ذلك يرجع إلي أن الزرعة في الميعاد المناسب مبكرا يسمح لنباتات القطن بالنمو والتحولات الفسيولوجية الطبيعية والتطور السليم أثناء المراحل الإنتاجية (الوسواس- التزهير- التلويز) وبالتالي تفتح اللوز والحصاد في الميعاد المناسب البيئية الحقليه المناسب من حيث درجة الحرارة ونسبة الرطوبه لضمان أعلي كمية وجودة من بذور القطن. وأخيرا الحصول علي تقاوي بذور القطن ذات مواصفات عالية الجودة عند الزراعة في المواعيد المناسبة لتقليل كمية التقاوي المستخدمة للزراعة وبالتالى إنخفاض تكاليف الإنتاج. وتوصي الدراسه بإستخدام بذور القطن من الجنية الأولي لميعاد الزراعه المبكر كتقاوي للزراعة في المواسم التالية لها للحصول على جوده للبذور وأعلي نسب إنبات ونمو وتحسين إنتاجيه محصول القطن.