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Response of some Yellow Maize Hybrids (*Zea mays* L.) to Sowing Date under Toshka Conditions

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ABSTRACT

In order to study the effect of sowing date on performance of hybrids yellow maize, tow field experiment were conducted in two successive summer seasons 2016 and 2017 at the Toshka Experimental station of Desert Research Center, Abu Simbel City, Aswan Governorate. Five sowing dates (March 1st, March 20th, April 10th, July 20th and August 10th) under studied on the yield and its attributes of four yellow maize hybrids(S.C. 168, S.C. 176,T.W.C.353 and T.W.C. 360). Results indicated that sowing date and hybrids significantly affected on plant height, number of grains per row, 1000 grain weight and grain yield kg/fed. The late sowing on Aug. 10*th* produced the highest significant parameters of maize plants; plant height, No. of ears/plant, number of raws/ear, 1000-grains weight and grain yields. On the reverse, the lowest values were obtained at medium sown on April10*th* on sown T.W.C. 360 hybrid was significantly higher than other hybrids in all traits under study in two seasons. The interactions was significant effected on plant height, No. of ears/plant, No. of rows/ear, No. of grains/ear, grains weight/ear and grain yield in both seasons. It could be concluded that sown SC. 176 or SC.168 hybrids during 10th August successfully improving production of maize yield and its components under Toshka conditions.

INTRODUCTION

Maize (*Zea mays* L.) is an essential cereal crop which grown in the summer or at late-summer seasons in Egypt. It is essentially used as animal and poultry feed and, recently, the maize flour has been recommended to be mix with wheat flour to overcome the shortage of wheat production in Egypt. Attempts to increase maize production could push through it growing at new reclaimed areas; one of the most suitable locations such Toshka. This area is differs in its soil particle distribution, chemical analyses and its fertility as well as climatic conditions than both of Delta and Nile valley areas.

Sowing date can play a major role in determining the grain yield, quality, seed germination and understanding whole phenological stages in many regions. Some researchers pointed out that especially, Dahmardeh (2012) in Iran who reported that the sowing date on the 5th of August produced the maximum grain yield which was similar to sowing date of 21th July and 20th August. Abdel Rahman *et al.* (2001) in Sudan and Avcioglu *et al.* (2003) in Turkey have found that earlier sown of maize significantly more. Of course, the terms 'early' and 'late' have to be specified for any specific growing conditions. Literature data shows that for each location an optimum maize sowing date exists and sowing before and after this date results in yield reduction.

Many research workers documented significant cultivar variations regarding yield and it's contributing traits, such as El-Zeir *et al.* (1998) showed that marked differences between SC 129 and TWC 320 hybrids concerning ear diameter, row number/ear, grain number/row, grain index and grain yield/plant as well as/fed., where the SC 129 was pioneer in this regard. Abd El-Maksoud and Sarhan (2008) reported that the TWC 310 cultivar was superior than both SC 10 and SC 122 as for ear length, number of grains/ear, grain index, grain yield /fed. Also, Abdou, *et al.*(2012) found that the TWC 352 hybrid had higher number of rows/ear as well as heavier grain index when compared with the other two hybrids tested. On the other hand, the SC 166 maize hybrid possessed significantly greater mean averages than both SC 162 and TWC 352 ones in most agronomic parameters of maize, being: ear length, number of grains/row, ear weight, grain weight/ear, the final yields per fad. Similar cultivar differences were documented by Hassan *et al.* (2008), Attia, and El-Dissoky. (2016), and Awadalla and Morsy (2016).

The aim of this investigation to maximize maize yield production in Toshka region depended on many factors which could be achieved through cultivating the promising maize cultivars that characterized by high yielding, tolerance to heat stress and drought.

MATERIALS AND METHODS

Two field experiments were carried out in the Desert Research Center (D.R.C) at the Experimental Farm (well No.85), Toshka area which located at 22 km north-west of Abu Simbel City, belong to Aswan Governorate, Western Desert (22°32′16″N, 31°30′40″E). During the two summer growing seasons of (2015 and 2016), to study the effect of sowing dates (March 1 th March 20 th April 20th, July 20th and August 10th) on the yield and its attributes of four yellow maize hybrids (S.C.168 S.C. 176, T.W.C. 353,and T.W.C. 360) hybrids. The preceding crop was wheat in both seasons. The physical and chemical properties of the soil before cultivation are presented in Table 1and chemical analysis of irrigation water in Table 2 and average temperature of the site 2008 - 2017 according to Meteorological Station at Toshka (Abu Simbel City) in Egypt in Table 3.

Table 1. Average of some Physical and mechanical properties of a representative soil sample from experimental site for both seasons.

Soil depth(Cm)	Coarse sand (%)	fine sand (%)	Silt (%)	Clay (%)	Textural class
0-30	78.94	18.09	2.95	0.02	Sand
30-60	77.23	19.97	2.77	0.03	Sand

Chemical properties

Soil depth (Cm)	pH	EC (dS/m)	Soluble cations (meL^{-1})				Soluble anions (meL^{-1})				O.M. (%)	N ppm
			Ca++	Mg++	Na+	K+	Co_3^-	HCO_3^-	Cl^-	SO_4^-		
0-30	7.95	1.82	7.3	4.6	17.1	1.5	0.00	1.2	18.8	10.6	0.09	59.5
30-60	7.82	1.91	6.7	4.3	15.5	1.6	0.00	1.1	17.9	9.1	0.05	61.7

Table 2. Water analysis results (Station at Toshka in Egypt) .

well No	PH	EC (µS/cm)	TDS mg/l		Ca	Mg	Na	K	Cations	CO_3	HCO_3	SO_4	Cl	Anions
85	6.9	768	447.25	Ppm	81.32	11.29	50.00	2.00		3.00	111.15	151.25	87.98	
				Epm	4.06	0.93	2.18	0.05	7.21	0.10	1.82	3.15	2.48	7.55
				%	56.26	12.87	30.16	0.71	100.00	1.32	24.12	41.70	32.85	100.00

Micro-elements

well No	Ag	Al	B	Ba	Cd	Co	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Si	Sr	V	Zn
85	0	0	0	0.05	0	0	0.15	0.02	0.25	0.002	0	0.014	0.003	4	0.35	0	0.008

Table 3. averages of the climatic normal of Abu Simbel meteorological Station (2008 - 2017).

Months	Temperature		Relative Humidity (%)	Wind speed (Kmph)	Sunshine Hours
	Max.	Min.			
March	30	14	26	14.4	304
April	36	19	21	14.4	303
May	39	23	20	13.3	326
June	41	25	20	10.8	324
July	40	24	23	7.2	332
August	40	24	26	10.8	322
September	39	24	25	14.4	288
October	29	15	37	14.4	310
November	24	11	43	10.8	295

The Studied Factors as Follows:

1- Sowing dates.

a- March 1 st

b- March 20 th

c- April 20th

d- July 20th

e- August 10th

2- Maize hybrids.

a- Single cross 168 (S.C. 168)

b- Single cross 176 (S.C. 176)

c. Three way cross 353 (T.W.C. 353)

c. Three way cross 360 (T.W.C. 360)

The four yellow maize hybrids were released by Maize Res. Dept., Agric. Res. Centre, Cairo, Egypt.

Treatments were carried out in a split plot design with three replicates, where the experimental plot area was 10.5m2 (5 lines x 0.60 m width x 3.5m length). The grains of cultivars were hand planted on five sowing date in both seasons. Before planting, the grains were treated by the recommended fungicides to avoid a possible harmful effect of soil diseases. Thinning was done to one plant/hill before 20 days from sowing when crop attained 15 cm height (3-4 leaves stage). Nitrogen, phosphorus and potassium fertilizers were added according to the recommended doses. Phosphorus fertilizer in the form of calcium super phosphate (15.5% P_2O_5) was added at the level of 200 kg/fed in one dose before planting. Potassium fertilizer in the form of potassium sulphate (48% K2O) at the level of 50kg/fed was added in the same time of adding phosphorus fertilizer. Nitrogen fertilizer was applied in the form of ammonium sulphate (20.6% N) at the level of 600 kg/fed in eight equal doses, the first one after seven days from planting and the final dose before flowering stage time. Drip irrigation was applied as needed. All the agriculture practices were applied as commonly used for growing maize and carried out according to the recommendations set by the Ministry of Agriculture.

Recorded Data

At harvest, samples each of five plants wer taken randomly from the ten in plot, so the following yield attributes were recorded: plant height , Ear length (cm), number of rows/ear, number of grains/row, number of raw/ear,1000-grains weight (grain index), grain yield t/ fed, a bulk sample including all maize plants found in an area of 4.2 m^2 was harvested from the third and fourth central ridges in each sub-plot, then the following measurements were documented grain yield t/fed.

The statistical analysis was done according to Gomez and Gomez (1984) and means of treatments were compared against least significant differences test (L.S.D.) at level 5%.

RESULTS AND DISCUSSION

A- Sowing Dates:

The results of the analysis of variance showed in (Tables 4&5) showed that the sowing date significantly affected No. of days to mid-teaseling, No. of days to mid-silking, plant height, number of ears/plant, number of grains/raw, ear length, number of raws/ear, 1000-grain weight and grain yield/fed. The sowing date on the 10th of August produced the maximum in all evaluated characters, except plant height which was longer on 1st March sowing.

The results revealed that maize hybrids were differed in their responses to sowing date in terms of maize ears length, grain yield, and thousand grain weights. Then, the most yield attributes appeared to be higher significantly on the 10th of August sowing date in both years. The late sowing may be the chance of growing plant to complete all of its physiological processes (vegetative and reproductive processes) at proper time than that of early and medium sown seasons. Early sowing till June, 10*th* caused a decline in all of the studied parameters throughout the studied. Sown at the suitable date give the better growth and development of crop as noticed by Kolawole and Samson (2009) who reported that due to the fact that good photosynthates accumulated in leaves and its transfer to economic part like grains, ears etc.

The late sowing produced greater yields compared to medium and early sowing in both years. The lowest grain yield was obtained by the medium sowing date in both years as shown in (Table 4&5) due to grain filling and harvest time were affected by weather. It might be suggested that the medium sowing had a shorter period for the production of seed and a slightly lower rate of grain production due to reduced growth, and exposure of plants

to warmer and longer photoperiod (long day) after the medium sowing date. This may be related to the number of developing grain on ears. In addition, late sown gave the chance of growing plant to complete all of its physiological processes (vegetative and reproductive processes) at proper time than that of medium and early sown. Sowing date on June, 10th caused a decline in all of the studied parameters throughout the studied seasons. Furthermore, Paolo (2012) and Zaremohazabieh *et. al* (2017) stated that the small change in sowing date had significant effect on Corn harvest index, biological yield, kernel yield in both years. Similar results were also reported by Liaqat *et al* (2018) who found that the sowing dates significantly affected crop phenology (teaselling, and slicing), crop growth plant height, yield contributing traits (ear length, rows per year, grains per year, ears per plant, and thousand grains weight) which ultimately affects both biomass and grain yield.

b- Hybrids performance:

Regarding days to mid-teaseling and days to mid-silking were given in Table (4). Statistical analysis of data exhibited that the differences were significant between maize cultivars on days to mid- tasseling and silking in the two growing seasons. The results agree with those reported by Ahmed *et al.* (2000) who mentioned that tasseling was affected significantly by maize hybrids. These results are supported by the findings of Habliza and Abdelhalim (2017).

Table 4. Means of No. of days to tasseling and No. of days to silking of four Maize hybrids as affected by Sowing date and their interaction during 2016 and 2017 seasons.

Characters Treatments	Days to Mid-tasseling	Days to mid-silking	Days to mid-tasseling	Days to mid-silking
Sowing date	2016		2017	
Mar. 1st	58.17	60.33	57.08	59.67
Mar. 20th	57.00	59.83	56.08	59.08
Apr. 10th	55.00	59.08	54.17	58.42
July 20th	58.58	60.75	57.67	60.25
Aug. 10th	60.25	62.17	59.17	61.75
F . test	*	*	*	*
LSD 0.05	0.59	0.57	0.65	0.51
Maize Hybrid				
SC.168	55.80	58.00	54.93	57.27
SC.176	53.40	56.13	52.47	55.60
TWC.353	59.73	62.93	58.80	62.27
TWC.360	62.7	64.67	61.13	64.20
F . test	*	*	*	*
LSD 0.05	0.69	0.32	0.89	0.77
Interaction H(V)× SD	NS	NS	NS	NS

Table 5. Means of plant height, No. of ears/plant, No. of grains/raw, ear length, No. of raw/ ear, 1000-grain weight and grain yield as affected by sowing dates on characters of four maize hybrids during 2016 and 2017 seasons under Toshka conditions.

Characters Sowing Dates	Plant height (cm)	No. of ears/ Plant	No. of grains/ Raw	Ear length (cm)	No. of raw/ Ear	1000-grain weight (g)	Grain Yield (kg fed^{-1}.)
				Season 2016			
1st Mar.	182.33	1.28	34.75	15.22	14.53	295.75	2.10
20th Mar.	175.67	1.10	33.60	13.92	13.57	291.08	2.01
10th Apr.	153.83	1.05	32.92	13.83	11.37	283.42	1.77
20th July	178.00	1.23	34.90	16.15	15.27	303.92	2.63
10th Aug.	174.42	1.43	36.08	17.03	15.40	310.08	3.27
F test	**	**	**	**	**	**	**
LSD at 5%	.0.82	0.06	0.67	0.09	0.13	1.92	0.08
Sowing Dates				Season 2017			
1th Mar.	181.67	1.26	34.52	15.07	14.47	294.08	2.07
20th Mar.	174.83	1.08	33.27	13.83	13.43	289.58	1.98
10th Apr.	153.33	1.01	32.78	13.70	11.35	281.50	1.73
20th July	177.33	1.20	34.75	16.03	15.20	302.75	2.61
10th Aug.	173.75	1.35	35.67	16.92	15.32	308.08	3.25
F test	**	**	**	**	**	**	**
LSD at 5%	1.81	0.12	0.60	0.15	0.28	3.19	0.07

Grain yield and yield components of plant height, number of ears/plant, number of grains/raw, ear length, number of raws/ear, 1000-grain weight and grain yield/fed during two seasons as shown in Table (6) were affected significantly by differences between maize hybrids, the TWC 353 hybrid exhibited higher number of raws/ear and grain yield/fed in two seasons, the differences were not significant between TWC 353 and SC 168 hybrids for the same traits. Meanwhile, the maximum value of number of ears/ plant and number of grains/raw were recorded by SC 168 hybrid while, the highest value of plant height and ear length were recorded by S.C. 176 hybrid. In addition, TWC 360 hybrid exhibited the superior value of 1000-grain weight than the other hybrids. It is worthy to mention that the differences among the studied hybrids in grain yield may be due to the differences in genetic structure between the four maize hybrids. The hybrid differences in all the studied traits of maize may be ascribed to the genetical differences among them, which play an important role for exploiting the uptake of the available nutrients and photosynthesis process leading to much noticeable changes of the metabolites accumulated in maize shortage organs. On the other hand, the results clearly indicated that the TWC 353 or SC 168 hybrid had a broader genetic base that helped it to be more responsive to agricultural options and environmental conditions prevailing in the surrounding media of the experimentation. Moreover, it might be attributed to the differences in photosynthetic activity of

the leaves, i.e., internal factor and/or the differences in light distribution of leaf surface of the crop canopy resulted from differences in leaf arrangement and to the differences in chlorophyll content and photosynthesis enzymes activity El-Koomy (2005). Similar maize hybrids performance as for the final yields per unit area and their attributes were documented by El-Gizawy and Salem (2010). Many investigators found that maize hybrids differed in yield and its components as recorded by Akram *et. al.,* (2010); Abdul Aziz *et. al.,* (2011)., Ahmad *et. al*.,(2011) and Abdou *et al.* (2012) who found that the T.W.C. 352 hybrid had larger number of rows/ear as well as heavier grain index when compared with the other two hybrids tested. On the other hand, the S.C. 166 maize hybrid possessed significantly greater mean averages than both SC 162 and TWC 352 hybrids ones in most agronomic parameters of maize, being: ear length, number of grains/row, ear weight, grain weight/ear. and Hafez and Abdelaal (2015)and found that the S.C.10 hybrid was significantly higher than other hybrids in all traits under study except shelling percentage and crude fiber %, which could increase palatability and digestibility of the hybrid. Similar maize cultivar performance as for the final yields per unit area and their attributes were documented by El-Zeir *et al.* (1998) and Hassan *et al.* (2008).

Table 6. Means of plant height, No. of ears/plant, No. of grains/raw, ear length, No. of raw/ ear, 1000-grain weight and grain yield as affected on four maize hybrids during 2016 and 2017 seasons under Toshka conditions.

Characters / Hybrids	Plant height (cm)	No. of ears/ Plant	No. of grains/ Raw	Ear length (cm)	No. of raw/ Ear	1000-grain weight (g)	Grain yield (kg fed^{-1}.)
				Season 2016			
S.C. 168	172.60	1.32	37.39	15.04	15.04	264.60	2.68
S.C. 176	178.67	1.25	33.15	15.56	13.84	273.40	2.06
T.W.C. 353	176.53	1.20	35.37	15.48	15.13	316.13	2.69
T.W.C. 360	163.60	1.o9	31.89	14.84	12.09	333.27	1.99
F test	*	*	*	*	*	*	*
LSD at 5%	1.66	0.06	0.91	0.12	0.27	1.48	0.02
Hybrids				Season 2017			
S.C. 168	172.00	1.30	37.07	14.99	15.00	263.73	2.65
S.C. 176	178.00	1.17	32.89	15.39	13.77	271.27	2.03
T.W.C. 353	175.87	1.17	35.15	15.33	15.05	314.47	2.66
T.W.C. 360	162.87	1.07	31.68	14.73	11.99	331.33	1.96
F test	*	*	*	*	*	*	*
LSD at 5%	2.07	0.11	0.59	0.27	0.24	3.84	0.06

C- The interaction effects:

The interaction between sowing date and maize hybrids on yield and its components i.e. plant height, number of ears/ plant, number of grains/raw, ear length, number of raws/ear, 1000-grain and grain yield during 2016 and 2017 seasons were appeared as presented in Tables (7a&b).

Table 7 a. Means of plant height, No. of ears/plant, ear length, No. of raw/ ear, 1000 - grain weight and grain yield as affected by the interaction between sowing date and maize hybrid on yield and its components in season 2016 under Toshka conditions.

Characters / Interaction		Plant height (cm)	No. of ears/ Plant	Ear length (cm)	No. of raw/ ear	1000-grain weight(g)	Grain yield (ten/fed.)
	SC 168	176.00	1.50	16.07	16.00	263.67	2.84
1st	SC 176	183.67	1.20	14.40	14.00	271.33	1.24
Mar.	TWC 353	193.33	1.20	15.87	15.33	316.67	2.71
	TWC 360	176.33	1.20	14.53	12.80	331.33	1.62
	SC 168	183.00	1.10	12.67	14.60	259.33	2.06
20th	SC 176	190.00	1.10	14.87	13.60	265.33	1.55
Mar.	TWC 353	170.33	1.20	14.33	15.20	312.67	2.73
	TWC 360	159.33	1.00	13.80	10.87	327.00	1.71
	SC 168	153.33	1.00	12.47	11.47	252.00	1.82
10th	SC 176	160.33	1.00	14.73	11.00	258.67	1.36
Apr.	TWC 353	153.00	1.20	14.47	13.73	304.33	2.34
	TWC 360	148,67	1.00	13.67	9.27	318.67	1.55
	SC 168	180.33	1.50	16.80	16.60	272.00	3.21
20th	SC 176	179.00	1.20	16.73	15.20	283.00	2.71
July	TWC 353	190.67	1.20	16.00	15.67	322.00	2.66
	TWC 360	162.00	1.00	15.07	13.60	338.33	1.94
	SC 168	170.33	1.50	17.20	16.53	276.00	3.47
10th	SC 176	180.33	1.73	17.07	15.40	288.67	3.45
Aug.	TWC 353	175.33	1.20	16.73	15.73	325.00	3.03
	TWC 360	171.67	1.27	17.13	13.93	350.67	3.12
F . test		**	**	**	**	**	**
LSD at 5%		3.85	0.19	0.18	0.38	3.46	0.10

Table 7b. Means of plant height, No. of ears/plant, ear length, No. of raw/ ear and grain yield as affected by the interaction between sowing date and maize hybrid on yield and its components in season 2017 under Toshka conditions.

Characters Interaction		Plant height (cm)	No. of ears/ Plant	Ear length (cm)	No. of raw/ ear	Grain yield (ten/fed.)
	SC 168	175.67	1.47	16.00	15.87	2.77
1st	SC 176	183.00	1.20	14.07	14.00	1.23
Mar.	TWC 353	192.33	1.17	15.80	15.27	2.65
	TWC 360	175.67	1.20	14.40	12.73	1.62
	SC 168	181.67	1.10	12.53	14.47	2.07
20th	SC 176	189.33	1.10	14.80	13.40	1.49
Mar.	TWC 353	170.00	1.17	14.20	15.13	2.69
	TWC 360	158.33	0.97	13.80	10.73	1.66
	SC 168	153.00	0.97	12.40	11.47	1.77
10th	SC 176	160.00	0.93	14.60	11.00	1.33
Apr.	TWC 353	152.33	1.17	14.07	13.60	2.31
	TWC 360	148.00	0.97	13.73	9.33	1.52
	SC 168	179.67	1.47	16.80	16.53	3.20
20th	SC 176	178.33	1.17	16.47	15.13	2.69
July	TWC 353	190.00	1.17	16.00	15.60	2.66
	TWC 360	161.33	1.00	14.87	13.53	1.89
	SC 168	170.00	1.50	17.20	16.67	3.46
10th	SC 176	179.33	1.47	17.00	15.33	3.43
Aug.	TWC 353	174.67	1.20	16.60	15.67	3.00
	TWC 360	171.00	1.23	16.87	13.60	3.12
F . test		*	*	*	*	*
LSD at 5%		4.00	0.21	0.41	0.39	0.10

The results to show a significant affect plant height, number of ears/plant, ear length, number of raws/ear and grain yield in the two seasons. On the other hand, the effect of this interaction was no significant on number of grain/raw in two seasons and 1000-grain weight in the second season. Maximum means of the interaction between sowing date and four maize hybrids were obtained from number of grains/raw, ear length, number of raws/ear and grain yield to SC.168 hybrid for higher production when planted on August 10th in the two seasons. Moreover, data showed that the highest number of ears/ plant and 1000-grain in the two seasons were achieved by SC 176 and TWC 360 hybrids, respectively with the same sowing date. While, the tallest plants were obtained by TWC 353 hybrid and plants date on1st March or 20th July. Maga *et al.* (2015) who indicated that the interaction effect of variety and sowing date was significant for plant height and grain yield/fed. Early sowing to 18th May and 1st June resulted in significant reduction of grain yield from 130.67 kg/plot to 127.18 kg/plot in QPM and 126.67 to 125 kg/plot in TZESR-Y. QPM when sown on 4th May gave the highest grain yield compared to when sowing was delayed to May 18th and June 1st. This result implies that May 4th sowing date appears to provide the optimum conditions for maize cultivation under Southern Guinea Savannah agro-ecological Zone. Govind *et al.* (2017) indicated that the interaction between sowing dates and hybrids did not show significant effect on No. days to 50 % tasseling and No. days 50 % silking. HM-5 hybrid recorded higher crop growth rate from 60 day after sowing (DAS) to maturity. No. days to 50 % tasseling, 50 % silking and maturity were delayed in last date of sowing, followed by HQPM-1, HM-4, HM-6 and lowest in case of HM-7.

CONCLUSION

It could be concluded that for maximizing grain yield per unit area under the condition of new reclaimed land of Toshka conditions by sowing S.C. 176 or S.C. 168 hybrids on the10th August.

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إستجابة بعض هجن الذرة الشامية الصفراء لمواعيد الزراعه تحت ظروف توشكى

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أجريت تجريتان حقليتان خلال موسمين متتالين ٢٠١٦و ٢٠١٧بمحطة بحوث توشكى التابعه لمركز بحوث الصحراء , ابوسمبل محافظة اسوان . لدراسة تأثير خمس مواعيد زراعه وهى (١ مارس و٢٠ مارس و١٠ أبريل و٢٠ يوليو و١٠ أغسطس)على المحصول ومكوناته لاربعه أصناف من الذرة الشامية الصفراء وهى (ه. ف. ١٦٨وه. ف. ١٧٦وه. ث.٣٥٣ و ٣٦٠) المنزرعة تحت ظروف توشكى ابوسمبل بأسوان ,نفذن التجارب فى تصميم القطع منشقه فى ثلاثه مكررات. أوضحت النتائج المتحصل عليها أن تأثير مواعيد الزراعه وتأثيرات هجن الذرة الشامية على ارتفاع النبات ، عدد الحبوب/الصف، ، وزن ال ١٠٠٠ حبة ومحصول الحبوب كان معنوياً.أثر الميعاد المتأخر(١٠ اغسطس) زيادة معنويه لصفات عدد الصفوف/ كوز وعدد الكيزان / نبات ووزن الاف حبه و محصول الحبوب. كان تأثير التفاعل معنويا على طول النبات وعدد الكيزان / النبات ، وعدد الصفوف / كوز ، وعدد الحبوب / صف ومحصول الحبوب في كلا الموسمين. بينما لم تسجل معنويه في صفه ٥٠% من النوره المذكرة والنورة المؤنثة في كلا الموسمين وزن ١٠٠٠ حبة في الموسم الثاني . وتوصى الدراسة بذراعة ه. ف. ١٦٨ أوه. ف. ١٧٦ فى العاشر من أغسطس لتعظيم انتاجية وحدة المساحه من محصول الذره الشاميه وذلك تحت ظروف توشكى.