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RESPONSE OF SOME MAIZE HYRBIDS TO LATE PLANTING DATES

BY

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ABSTRACT

This investigation was carried out at Sids Res. Stn., in the Middle of Egypt during 2006 and 2007 seasons to study the response of some maize hybrids to late planting dates. Twelve maize hybrids (SC10, SC120, SC122, Sc SC123, SC124, SC129, SC155, TWC311, TWC314, TWC321, TWC324 and TWC352) were planting on Jul.1, Jul.15, Aug.1 and Aug.15. Results revealed significant differences among and within each maize hybrid in their response to late planting. Delaying planting dates significantly decreased number of days from planting to 50 % teaseling and silking, plant and ear heights. Grain yield was reduced about 33, 24 and 29% in the first, second season and the combined analysis over both years, respectively, when planting date delayed from Jul. 1 to Aug.15. Also, the SC 129 surpassed the other growing maize hybrids in producing the highest grain yield (30.07, 28.72 and 29.4 ard/fed.) while the TWC 352 had the lowest grain yield (13.31, 8.09 and 10.7 ard/fed.) in the first season, second season and the combined analysis over both years, respectively. In the same trend, significant interaction effect of planting dates and the growing maize hybrids was recorded on all studied traits except for number of days from planting to 50 % teaseling and silking in the first growing season. This study revealed that SC 129 the most suitable maize hybrid for late planting conditions, while the yellow maize hybrids TWC 352 and SC155 were the most susceptible.

INTRODUCTION

Some Egyptian farmers are used to cultivate one of the vegetable crops which consider a cash crop between winter and summer field crops. Therefore, in such conditions farmers are forced to plant maize late It well known that late planting is linked with yield reduction. The objective of this study was to find out the most suitable maize hybrid (s) which performed well under late planting dates. Tanaka and Hara (1971) reported that delay in planting reduced the length of the vegetative growth period, delayed silking and shortened the ripening as well as reduced grain yield. Amer *et al.* (1991) found that mid June planting produced the highest grain yield whereas planting on mid July decreased number of days from planting to mid silking, plant height and grain yield. Younis *et al.* (1995) reported that planting maize on mid may prolonged silking period, this period was lengthened in early and late planting dates. Plant and Ear heights were significantly affected by delaying planting date. Gouda *et al.* (1998) studied the response of maize white single cross to planting dates. Five planting dates biweekly intervals beginning on 1st may tell 1st July .They found that the period from planting to 50% tasseling and silking significantly decreased from early to late planting. The highest grain yield was obtained by planting maize on mid May and first June. Hassan (1999) reported that delaying planting dates significantly decreased number of days from planting to 50 % teaseling and silking, plant height, ear height and grain yield. Norwood (2001) indicated that earlier planting (Mid April) decreased yield and water use efficiency, the highest yield and water use efficiency were achieved with later planting dates (early May). Darby and Lauer (2002) studied

the response of whole plant dry matter yield to planting dates was quadratic, with maximum dry matter production between 21.9 and 17.7 Tonha^{-1} and optimum planting dates between 27 April and 10 May. Nielsen *at al* (2002) showed that delayed planting shortens the effective growing season for corn, increasing the risk of exposure to lethal temperatures late in the season before grain maturation. Wiatrak *et al.* (2004) showed that delayed planting dates in the U.S southeast often result in insect and disease problems on corn .Grain yield was greatest at March and April planting dates (16.1 Ton ha^{-1}) and least from July (6.1Ton ha^{-1}) and August (4.5 Ton ha^{-1}) planting dates.

MATERIALS AND METHODS

This investigation was carried out at Sids Res. Stn., in the Middle of Egypt during 2006 and 2007 seasons to study the response of some maize hybrids to late planting dates. Four different planting dates were planting on Jul.1, Jul.15, Aug.1 and Aug.15. Every planting date was conducted in a separate trial and included twelve maize hybrids; SC10, SC120, SC122, SC SC123, SC124, SC129, SC155, TWC311, TWC314, TWC321, TWC324 and TWC352, arranged in a randomized complete block design with four replications, then combined analysis over planting dates was performed where replications were hosted within dates. The experimental unite consisted of four ridges; 6m in length with 70 cm between ridges and 25 cm between hills. Optimal cultural practices were carried out to safeguard the full expression of all plant characteristics. Time of tasseling and silking was determined as number of days from planting to 50% tasseling and silking. Ten guarded plants were taken randomly to estimate plant height (cm) and ear height (cm) from the ground surface to the top of tassel and the highest ear-bearing node. respectively. Grain yield (ard/fed) was estimated from the two middle ridges of each experimental plot and was adjusted on the basis of 15.5% grain moisture. Data were subjected to statistical analysis of variance using SAS software program (SAS Institute 1990).Combined analysis was done for data of both seasons when the homogeneity test was not significant according to (cohran and cox, 1957).

RESULTS AND DISCUSSION

Effect of growing season.

Data in Table (1) show that significant effects existed for all studied traits except ear height. Higher mean values for plant height, ear height and grain yield were detected in the first season, while higher mean values for number of days from planting to 50% tasseling and silking were detected in the second season.

Table (1): Mean values of seasonal effects:

Seasons	Days to50% tasseling	Days to 50% silking	Plant height (cm)	Ear height (cm)	Grain yield (ard./fed)
2006	56.9	57.7	231	128	21.5
2007	58.5	59.6	224	125	18.3
L.S.D.$_{0.05}$	**0.5**	**0.5**	**6**	**n.s**	**1.3**

Effect of planting dates.

All traits under study in the two growing seasons and the combined analysis over both seasons were significantly affected by delaying planting dates (Table 2). In the first season, planting on July 15 and on the first of August had lower number of days from planting to 50% tasseling and silking followed by planting on the first of July and then August 15. Similar trend was noticed in the second season as well as the combined analysis over both seasons. Generally, days to

50% tasseling and silking decreased gradually by delaying planting date. This result might be attributed to the short day length, which is linked to late planting. Results are in close agreement with those of Younis *et al.* (1995), Gouda *et al.* (1998) and Hassan (1999) who found that number of days from planting to 50% tasseling and silking decreased by delaying planting date.

Data presented in Table (2) showed that delaying planting dates significantly reduced plant height at harvest in both growing seasons and the combined analysis. The shortest plants were associated with the latest planting dates. The reductions in plant height were 19.3, 21.7 and 20.4 % 2006, 2007 and the combined analysis over both seasons, respectively. This reduction in plant height might be due to the reduction in the length of the vegetative growth period and concomitant environmental factors.

Effect of delaying planting date on reducing ear height was significant in both growing seasons and the combined analysis (Table2). Delaying planting dates was coupled to the lowest ear placement as compared with early planting date. This trend was clear in 2006, 2007 and the combined over both years. The significant effect of late planting on growth characters might be attributed to weather condition prevailing during maize growth particularly temperature, light duration and its intensity.

Grain yield was significantly reduced by delaying planting. Maize hybrids differed greatly in their response to late planting. Results showed that planting on Aug.15 was associated with the lowest grain yield in 2006, 2007 and the combined over both years. The highest grain yield was liked to planting maize on the begging and mid of Jul. (table 2) the differences between Jul. 1 and Jul.15 in terms of grain yield was grain yield was not combined over both years. Grain yield was reduced to 33.5, 24.4 and 29.3% in 2006, 2007 and the combined over both years respectively, when planting date delayed from Jul.1 to Aug.15. In other words, delaying planting date from begging of June to mid August reduced grain yield production about 6.5 ard/fed.

Planting date X year interaction was significant for all traits, except for no of days to 50 % tasseling indicating that the effect of planting dates was inconstant from season to another (Table 2). Significant varietal differences in growth characters and yield attributes as well as grain yield were reported by Amer *et al.* (1991), Khedr *et al.* (1990) and Gouda *et al.* (1998).

Hybrid effect.

Number of days from planting to 50% tasseling of maize hybrids was significantly different. It could be noticed that SC 155 was the earliest hybrid in the first season but without significantly differences with SC120, SC124, 129, TWC311 and TWC351. In contrast, in the second season, SC129 was the earliest hybrid but it did not significantly differ from SC120, 155 and TWC311. In addition, in the combined analysis over both seasons reveled that SC129 was the earliest for both no. of days from planting to 50% silking and tasseling but without superiority over those of SC155 and TWC.311. On the other hand, the SC 123 (58.88 days) hybrid was the latest one for silking and tasseling dates in the combined analysis over both years.

Concerning maize hybrids, data presented in Table (3) revealed that significant differences were detected among them for number of days to 50% silking. Among the twelve growing maize hybrids it could be noticed that SC155 (56.69 days) was the earliest, while the SC123 was the latest one in the first season. While the SC129 (58 days) was the earliest hybrid and TWC 324 (60.35) was the latest one in the second season. However the SC124 was the earliest hybrid (57.63) and TWC.324cv (59.69) was the latest one on the combined analysis over both years. These results were acceptable sense each hybrid represents its own behavior according to it's genetically structure in the growing environment.

50% tasseling and silking decreased gradually by delaying planting date. This result might be attributed to the short day length, which is linked to late planting. Results are in close agreement with those of Younis *et al.* (1995), Gouda *et al.* (1998) and Hassan (1999) who found that number of days from planting to 50% tasseling and silking decreased by delaying planting date.

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Effect of delaying planting date on reducing ear height was significant in both growing seasons and the combined analysis (Table2). Delaying planting dates was coupled to the lowest ear placement as compared with early planting date. This trend was clear in 2006, 2007 and the combined over both years. The significant effect of late planting on growth characters might be attributed to weather condition prevailing during maize growth particularly temperature, light duration and its intensity.

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Table (2): Effect of late planting dates on studied traits of some maize hybrids in 2006, 2007 and combined analysis over both years.

Planting dates (D)	Days to 50% tasseling			Days to 50% silking			Plant height (cm)			Ear height (cm)			Grain yield (ard./fed)		
	2006	2007	Comb	2006	2007	Comb	2006	2007	Comb	2006	2007	Comb	2006	2007	Comb
Jul.1	57.1	58.1	57.6	57.5	58.9	58.2	248.1	264	256	143	155	149	24.0	20.5	22.2
Jul.15	55.0	58.6	57.0	56.3	59.5	57.9	245.5	223	234	137	126	132	24.4	20.4	22.4
Aug.1	55.8	58.0	56.9	56.8	59.4	58.0	227.8	202	215	125	108	117	21.7	16.9	19.3
Aug.15	59.5	59.1	59.2	60.4	60.3	60.6	200.8	207	204	107	108	108	15.9	15.5	15.7
L.S.D. 0.05 for DXY	0.5	0.5	0.5	0.4	0.5	0.5	6	6	6	4	5	4	1.3	1.5	1.3

Table (3): Grain yield and growth characters as influenced by maize hybrids in 2006, 2007 and their combined.

Hybrid (H)	Days to 50% tasseling			Days to 50% silking			Plant height (cm)			Ear height (cm)			Grain yield (ard./fed)		
	2006	2007	Comb	2006	2007	Comb	2006	2007	Comb	2006	2007	Comb	2006	2007	Comb
SC10	57.6	59.1	58.3	58.4	59.9	59.2	238	239	239	131.9	133	133	22.3	20.7	21.5
SC120	56.8	57.6	57.2	57.5	58.6	58.0	238	233	235	134	133	134	24.5	22.1	23.3
SC122	57.1	58.8	58.0	57.9	59.9	58.9	223	224	224	122	124	123	23.2	20.5	21.9
SC123	57.9	59.8	58.9	58.6	60.7	59.6	235	230	232	130	131	131	24.5	19.9	22.2
SC124	56.5	58.3	57.4	57.3	59.4	58.4	231	217	224	128	120	124	22 1	18.3	20.2
SC129	56.2	56.9	56.6	57.2	58.0	57.6	238	242	240	133	137	135	30.1	28.7	29.4
SC155	56.1	57.6	56.8	56.7	58.9	57.8	212	198	205	121	105	113	14.1	9.4	11.8
TWC311	56.2	57.7	57.0	57.2	58.9	58.1	232	222	227	128	122	125	23.3	21.0	22.1
TWC314	56.9	58.4	57.6	57.8	59.6	58.7	227	233	230	128	133	130	20.1	19.1	19.6
TWC321	57.8	59.1	58.5	58.6	60.3	59.4	229	224	227	127	120	123	21.4	17.9	19.6
TWC324	57.8	59.9	58.9	58.5	60.9	59.7	240	232	235	132	129	131	19.1	13.9	16.5
TWC352	56.2	58.2	57.2	57.1	59.7	58.4	224	197	210	119	11	115	13.3	8.1	10.7
L.S.D. 0.05 for HXY	0.8	0.9	0.6	0.8	0.9	0.6	11	11	. 7	7	9	5.7	2.2	2.5	1.7

Table (3) showed that the differences among the growing maize hybrids were significant in the two growing seasons and the combined analysis. Three way cross 324 was the tallest hybrid, whereas SC155 was the shortest one in the first season. But SC129 was the tallest hybrid, while the yellow maize hybrids TWC 352 and SC 155 were the shortest in the second growing season and the combined analysis over both seasons over both years.

Three way cross 352 had the shortest ear height while SC120 had the highest ear height in the first season (Table 3). But SC155 had the shortest ear height while SC 129 had the highest ear height in the second season and the combined analysis over both years.

Single cross 129 was the most superior hybrid in term of grain yield in 2006, 2007 and the combined analysis over both years, averaged over all planting dates. Hybrids SC120, SC122, 123 and TWC311 followed SC 129 on based of the combined means. On the other hand, the yellow maize hybrids TWC 352 and SC 155 were produced the lowest grain yield in 2006, 2007 and the combined analysis over both seasons over both years.

Table (3) shows that the effect of interaction between hybrids and seasons was statistically significant for all traits, this interaction with seasons was caused mainly by different ranking of hybrids from season to another.

Significant hybrid differences among maize hybrids in terms of grain yield and its attributes were achieved by Bedeer (1979), Khedr *et al.* (1991) and Gouda *et al.* (1998).

Hybrid x late planting dates interaction effect.

Mean Squares associated with hybrids and delaying planting date were found herein to reach the level of significance in the all traits under study at the combined analysis (Table 4). Regarding no of days to 50% tasseling SC129 was the earliest when planted on the first Aug. but without significant differences those of SC 155 and TWC.352 when planted on the first July, SC120, 155 and TWC.352 when planted on the mid of July, Sc120, 123,155, TWC311, TWCT14 and TWC.352 when planted on the first Aug. On the other hand, the SC123 and TWC.324 gave the highest values when planted on the mid of Aug.

For silking date, SC 155 was the earliest one when planted on the first of July but without significant superiority over those hybrids SC124, 129 and TWC.311, 314 and 352 when planted on Jul.15 and SC 129, 155, 311, 314 and 352 when planted on the first of Aug.

For plant height, SC155 was the shortest hybrid when planted on Aug.15 followed by TWC.352 in the same planting date. However, the tallest plant was obtained from SC10 when planted on the first of July but without significant superiority than all hybrids when planted on the first of July.

Three way cross 352, SC 124 and SC155 were the lowest values for ear height when planted on the mid of Aug. while SC 120 had the highest ear height when planted on the first of July but without significant superiority than all hybrids.

Regarding grain yield (ard/fed.), SC 129 gave the highest values (31.82, 30.10 and 30.07 ard/fed.) when planted on the first of Aug., first of July and Jul.15, respectively but without significant between them. On the other hand, the lowest grain yield was obtained by TWC 352 followed by SC 155 when planted on Aug.15.

Mean squares for the interaction between hybrids, delaying planting date and seasons were significant for all traits, indicating that the effects of interaction between hybrids and planting date were differently from season to another.

Finally, it could be concluded that SC129 was the most appropriate maize hybrid for late planting.

Table (4): Effect of interaction between late planting dates (D) and maize hybrids (H) on studied traits in the combined analysis over 2006 and 2007 seasons.

D X H		Days to 50% tasseling	Days to50% silking	Plant height (cm)	Ear height (cm)	Grain yield (ard./fed)
-Jul.1	SC10	58.2	58.6	266	155	22.5
	SC120	57.9	58.5	260	157	21.1
	SC122	58.0	58.6	247	143	22.4
	SC123	58.0	59.0	255	151	25.1
	SC124	57.0	57.5	256	148	23.9
	SC129	56.7	57.5	255	148	30.1
	SC155	55.7	56.2	254	144	21.2
	TWC311	57.4	58.2	257	151	24.2
	TWC314	58.0	58.9	259	154	21.7
	TWC321	58.1	58.9	246	144	20.3
	TWC324	59.0	59.6	261	144	16.0
	TWC352	56.7	57.2	256	148	18.1
-Jul. 15	SC10	57.6	58.5	239	132	23.0
	SC120	55.9	56.4	236	135	28.1
	SC122	57.2	58.2	229	128	24.4
	SC123	58.9	59.4	238	132	23.7
	SC124	56.9	58.0	231	132	20.4
	SC129	55.7	56.7	247	141	30.1
	SC155	55.6	56.6	221	122	14.1
	TWC311	57.1	57.7	230	129	24.2
	TWC314	57.0	57.9	236	133	23.0
	TWC321	57.2	58.0	241	129	23.3
	TWC324	58.1	59.0	245	141	20.4
	TWC352	56.5	57.9	221	124	13.7
Aug.1	SC10	57.7	59.0	232	122	22.2
	SC120	56.6	58.0	222	120	23.5
	SC122	56.9	58.0	214	114	22.6
	SC123	56.4	59.1	223	126	22.7
	SC124	57.1	58.2	212	115	20.2
	SC129	55.1	56.5	232	130	31.8
	SC155	56.1	57.2	189	100	7.4
	TWC311	55.2	56.9	215	113	21.4
	TWC314	56.6	57.9	222	123	19.7
	TWC321	58.6	59.7	214	113	18.9
	TWC324	58.1	58.6	219	121	16.7
	TWC352	56.2	57.9	186	102	7.2
Aug. 15	SC10	59.6	60.5	218	121	18.5
	SC120	58.5	59.2	222	122	20.5
	SC122	59.7	60.7	203	106	18.0
	SC123	60.2	61.1	212	114	17.3
	SC124	58.6	59.7	195	100	15.8
	SC129	58.7	59.7	223	121	25.6
	SC155	59.9	61.0	157	86	4.3
	TWC311	58.1	59.4	207	107	18.8
	TWC314	58.9	60.2	204	111	17.0
	TWC321	59.9	60.6	204	108	16.0
	TWC324	60.2	61.5	218	116	12.9
	TWC352	59.4	60.6	179	85	3.8
L.S.D$_{0.05}$for DXHXY		1.7	1.7	21	16	3.4

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إستجابة بعض هجن الذرة الشامية للزراعة المتاخرة

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قسم بحوث الذرة الشامية-معهد بحوث المحاصيل الحقلية-مركز البحوث الزراعية

أقيمت اربعة تجارب حقلية بمحطة البحوث الزراعية بسدس خلال موسمى الزراعة ٢٠٠٦ و ٢٠٠٧ لدراسة إستجابة بعض هجن الذرة الشامية للزراعة المتأخرة حيث زرع إثنى عشر هجينا هى الهجن الفردية ١٢٠، ١٢٢، ١٢٤، ١٢٣، ١٢٩، ١٥٥ والهجن الثلاثية ٣١٤، ٣١١، ٣٢١، ٣٥٢، ٣٢٤ فى بداية ومنتصف يوليو وكذلك فى بداية ومنتصف أغسطس و كان التصميم المستخدم قطاعات كاملة العشوائية فى أربعة مكررات.

وتشير النتائج إلي وجود فروق معنوية بين هجن الذرة الشامية في إستجابتها للتاخير في ميعاد الزراعة حيث أدى تأخير ميعاد الزراعة إلي نقص عدد الأيام من الزراعة حتى خروج ٥٠% من النورات المذكرة والمؤنثة وانخفاض طول النبات وإرتفاع الكوز.نقص محصول الحبوب معنويا بنسبة ٣٣%و٢٤%و٢٩% في الموسم الأول والثاني والتحليل التجميعي علي الترتيب عند تأخير ميعاد الزراعة من أول يونيو حتى منتصف اغسطس.تفوق الهجين الفردى ١٢٩ معنويا على جميع الهجن الاخري المنزرعة فى إنتاج أعلى محصول للحبوب/فدان حيث أعطى ٣٠,١، ٢٨,٧، ٢٩,٤ أردب/فدان بينما أعطى الهجين الثلاثي ٣٥٢ أقل محصولا للحبوب ١٣,٣، ٨,١، ١٠,٧ أردب/فدان في الموسم الأول والثاني والتحليل التجميعى على الترتيب.كان التفاعل بين هجن الذرة الشامية الإثني عشر المنزرعة ومواعيد الزراعة معنويا في جميع الصفات المدروسة ماعدا عدد الأيام من الزراعة حتي خروج ٥٠% من النورات المذكرة في الموسم الأول فقط.من خلال هذه الدراسة كان الهجين الفردى ١٢٩ أقل الهجن تأثرا بتأخير ميعاد الزراعة وكان أكثرهم ثباتا وأعطى أعلى محصول بينما كان الهجينان الأصفران ١٥٥ و ٣٥٢ أكثر الهجن ضررا وأقلهم ثباتا ومحصولا بتاخير ميعاد الزراعة وبناءا عليه يمكن التوصية بزراعة الهجين الفردي ١٢٩ في حالة الزراعة المتأخرة.