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EFFECT OF LATE PLANTING ON GRAIN YIELD OF SOME MAIZE HYBRIDS

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ABSTRACT

This investigation was conducted at Nubaria Res. Stn. In 2010 and 2011 seasons to study the response of some maize hybrids to late planting dates. Eleven maize hybrids (SC10, SC122, SC128, SC129, SC164, SC166, SC167, SC168, TWC321, TWC324 and TWC329) were planted on July1, July15, Aug.1 and Aug.15. Results showed significant yield differences among the hybrids in their response to late planting. Delaying planting after July 15^{th} significantly increased the number of days from planting to 50% tasseling and silking but decreased plant and ear heights. Grain yield reduced with delaying planting from July1 to Aug.15. Growing maize in the period from July 15 to Aug.1 significantly increased leaf blight disease infection, while planting on Aug.15 showed significant decrease in disease infection compared to planting on the previous period. Single cross 10 surpassed all hybrids in grain yield (19.40 ard/fed) in the first season, while TWC 321 produced the highest grain yield (20.36 ard/fed) in the second one. On the other hand, SC128 was the most inferior in grain yield (13.44 ard/fed) in both seasons, while SC122 gave the lowest grain yield (15.78 ard/fed) in the second season. The interaction between hybrids and planting dates was significant for all studied traits, except ear height in the second season. This study indicated that SC10 maybe the most suitable maize hybrid for late plantings followed by TWC 321 and SC166.

***Key words:** hybrids, leaf blight, late plating, maize.*

1. INTRODUCTION

In Egypt, in some areas farmers are used to plant maize late in the summer after harvest of some vegetable crops in the spring (March- April). Testing the effect of late planting on grain yield of maize hybrids is extremely important for such farmers. Late Planting time is one of the most important aspects of production management. Tanaka and Hara (1971) in Japan found that delay in planting reduced the length of the vegetative growth period, delayed silking and shortened the ripening period as well as reduced grain yield. Amer *et al.*, 1991) in Egypt, reported that mid-June planting produced the highest grain yield, whereas planting on mid-July decreased the number of days from planting to mid-silking, plant height and grain yield. Late Planting can affect yield through influencing seedling emergence, plant growth, pollination and maturity (Noormohammadi *et al.*, 1997) in Iran. Crop planting in the suitable date results in good root development, increment of plant tolerance against stresses and finally increased grain yield (Dasilva *et al.*, 1999). Grain yield is a complex character determined by several components which reflect positive or negative effects upon this trait .It is well known that late planting can result in low yield because the probability exists that unfavorable climatic conditions can occur during the growing season. Hassan (1999) in Egypt, indicated that delayed planting (July) significantly decreased the number of days from planting to 50% tasseling and silking, plant height, ear height and grain yield. Norwood (2001) in U.S.A, revealed that early planting (mid-April) decreased yield and water use efficiency. The highest yield and water use efficiency were obtained in May planting. Nielson *et al.*, (2002) in U.S.A, reported that delayed planting (June) 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) in U.S.A, found that delayed corn planting in U.S southeast often results in insect and disease problems and the highest grain yield(16.1 t ha^{-1}) was obtained when planting was in March and April, while the lowest yields (6.1 t ha^{-1} and 4.5 t ha^{-1}) were obtained when planting was in July and

August, respectively. Khalil (2007) in Egypt, stated that yield of the studied hybrids was significantly decreased by delay planting from May 25 to June 25. El-Galfy *et al.*, (2009) in Egypt, indicated that late planting dates (July-August) significantly decreased the number of days from planting to 50% tasseling and silking, plant and ear heights. Grain yield was reduced by 33, 24 , and 29% in the first and second seasons and also in the combined analysis over both years, respectively, when planting date was delayed from July1 to Aug.15. Late planting (July-August) normally exhibits higher leaf blight disease infection compared to normal season (May- June) planting. Bair *et al.*, (1990) and Tefferi *et al.*, (1996), found that Leaf blight disease reduced yields of susceptible hybrids. Khalifa and zein El-Abdeen (2000) in Egypt, indicated that late planting increased infection with leaf blight.

The objective of this study was to find out the most suitable maize hybrid (s) which perform well under late planting conditions.

2. MATERIALS AND METHODS

A field experiment was conducted at Nubaria Res. Stn., Egypt in 2010 and 2011 seasons to study the response of some maize hybrids to late planting dates. Four different planting dates were practiced i.e., July1, July15, Aug.1 and Aug.15. Every planting date was carried out in a separate trial included eleven maize hybrids; SC10, SC122, SC128, SC129, SC164, SC166, SC167, SC168, TWC321, TWC324, and TWC 329 . Experimental design was randomized complete blocks arranged in incomplete blokes with four replications, where replications were nested within planting dates. Experimental plot consisted of two rows 6m in length, 80 cm in width and hills were spaced 20 cm within the row. All cultural practices for maize production were applied as recommended. Twenty m^3/feddan of a farm manure was added to all experimental units before planting in both seasons. Thirty kg p_2o_5 and 24 kg K_2o/feddan were added during soil preparation. Nitrogen fertilizer (120 kg N) was added in the form of ammonium nitrate (33.5% N). Nitrogen was split into two equal doses. Studied traits were the number of days from planting to 50% tasseling (pollen shedding) and silking, plant height, ear height, grain yield, and leaf blight disease infection. Plant and ear heights (cm) were measured from ground surface to the top of tassel and the highest ear-bearing node, respectively. Grain yield (ard/fed) was estimated from the two rows of each experimental plot and was adjusted on the basis of 15.5% grain moisture. Percentage of leaf blight disease infection under natural infection conditions was measured 15 days after mid-silking on 2011 season and the data were transformed before statistical analysis according to log (x). Data were statistically analyzed according to Steel and Torrie (1980). Bartlett's test of homogeneity was used according to Bartlett (1937).

3. RESULTS AND DISCUSSION

Bartlett's test of homogeneity of yield variance was performed . Results revealed that chi-square value was 15.3 with probability> chi-square = < 0.00001 indicating that combining ability analysis between years is not valid.

3.1. Effect of planting dates

Data presented in Table (1) revealed that all studied traits were significantly affected by delaying planting dates in both seasons. It is noticed that planting in the first of July gave the lowest number of days from planting to 50% tasseling and silking, while mid of August gave the highest number of days to 50% tasseling and silking in the two growing seasons. Therefore, the general trend showed that the number of days to 50% tasseling and silking increased clearly by delaying planting.

Results in Table (1) showed also that delaying planting significantly decreased plant and ear heights in both seasons. The shortest plants and the lowest ear placement were associated with the latest planting date (August) compared with early planting dates. This reduction in plant and ear height might be attributed to the reduction in length of the vegetative growth period. Also, other factors such as temperature, light duration and photoperiod as well as day and night temperature differences could be taken in consideration in this respect. These results are in accordance with those obtained by Ibrahim *et al.*, (1995), Aly (1998), Gouda *et al.*, (1998), Sherif *et al.*, (2005), and El-Galfy *et al.*, (2009). Leaf blight disease infection under natural infection conditions was recorded only in 2011 in planting dates from Jul.15 to Aug.15. Results showed that July 15 and Aug.1 planting resulted in the highest disease infection (26.1 and 29.5%, respectively) compared to Aug.15 planting (18.4 %), which may indicate that planting in the period from Jul.15 to Aug.1 favors high infection with this disease. The esults need to be confirmed under artificial infection conditions. Khalifa and Zein El-Abedeen (2000) found that late planting (mid-July) increased infection with leaf blight under surface and sprinkler irrigation

Table (1): Effect of late planting dates on days to 50% tasseling and silking, plant and ear height(cm), grain yield (ard fed^{-1}), and leaf blight infection in 2010 and 2011 seasons.

Planting date	Days to 50% tasseling(d)		Days to 50% silking(d)		Plant height (cm)		Ear height (cm)		Grain yield (ard / fed)		Leaf blight * infection	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	Org.+	Trans.++
July1	58.4	58.1	60.5	59.9	188	202	98	104	22.36	24.63	-	-
July15	62.5	62.2	64.4	64.9	174	196	87	100	14.45	20.68	26.1	1.38
Aug.1	62.8	64.0	65.8	67.3	176	183	84	91	13.77	13.77	29.5	1.41
Aug.15	65.5	65.1	69.1	69.8	170	173	78	82	12.94	12.01	18.4	1.13
LSD 0.05	0.8	0.4	0.6	0.7	5.0	4.4	2.7	3.8	1.25	2.39	5.08	0.27

- * Leaf blight scores were taken in 2011 only.
- + org: original data (%).
- ++ Trans: Transformed data into log (x)

Table (2): Average grain yield ,growth characters and leaf blight infection of some maize hybrids over 4 late planting dates in 2010 and 2011.

Hybrid	Days to 50% tasseling(d)		Days to 50% silking(d)		Plant height (cm)		Ear height (cm)		Grain yield (ard / fed)		Leaf blight	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	Org	Trans
SC 10	63.6	62.9	66.3	66.2	185	197	95	97	19.40	19.23	26.7	1.36
SC 122	63.5	63.1	66.8	66.8	174	190	87	96	14.14	15.78	34.2	1.48
SC128	61.2	62.6	64.3	66.1	174	188	85	93	13.44	16.39	21.7	1.27
SC129	60.8	61.0	63.1	63.8	185	190	92	95	16.55	18.77	15.8	1.18
SC164	61.6	62.6	64.2	65.5	174	179	90	89	15.67	15.99	25.8	1.37
SC166	61.5	61.0	64.1	63.6	173	184	85	93	17.06	18.93	24.2	1.32
SC 167	61.9	62.2	64.6	64.9	173	181	81	93	16.56	17.25	25.8	1.23
SC168	63.1	61.8	65.9	64.6	173	182	79	91	15.60	17.91	30.0	1.45
TWC321	62.4	63.2	64.8	66.1	174	196	84	97	16.37	20.36	21.7	1.29
TWC324	63.2	63.0	65.6	66.3	183	196	89	98	14.74	18.77	24.2	1.23
TWC329	62.6	62.5	64.8	66.1	181	192	87	97	15.16	16.14	21.7	1.19
L.S.D 0.05	0.6	.05	0.5	0.7	4.6	4.4	4.1	3.6	1.13	1.37	9.7	0.24

systems.

Delaying planting date from Jul.1 to Aug.15 significantly reduced grain yield by 42.13% and 51.24% in both seasons. Results showed that grain yield reached its maximum at July 1 planting in both years (22.36 and 24.63 ard/fed), respectively. In contrast, delaying planting to Aug.15 gave the lowest grain yield (12.94 and 12.01 ard/fed) in the two years, respectively. It could be noticed that delaying planting from Aug.1 to mid Aug. had no significant reduction in grain yield in both seasons (Table 1). These results are in accordance with

Table (3): Effect of interaction between late planting date and maize hybrids on the studied traits in 2010 and 2011 seasons.

DxH		Days to 50% tasseling(d)		Days to 50% silking(d)		Plant height (cm)		Ear height (cm)		Grain yield (ard / fed)	
		2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
	SC10	58.8	58.3	60.8	61.0	203	217	108	111	27.68	22.38
	SC 122	58.5	58.5	60.0	60.5	180	206	97	107	21.89	25.36
	SC 128	56.5	58.3	58.5	59.8	184	203	89	104	20.71	23.22
	SC 129	56.3	56.0	58.5	57.8	205	203	103	107	22.54	25.75
	SC 164	58.5	58.5	61.0	59.8	180	196	101	102	22.93	25.78
Jul. 1	SC 166	58.5	57.3	60.8	58.8	185	197	98	104	23.74	25.52
	SC 167	58.5	58.0	61.3	59.5	184	191	101	102	23.00	25.18
	SC 168	59.0	58.0	60.8	60.0	177	190	88	100	21.81	27.56
	TWC321	59.5	58.8	61.5	60.5	189	209	94	105	21.15	26.27
	TWC324	59.0	59.0	61.5	60.8	200	210	106	104	20.51	25.13
	TWC329	59.3	58.8	61.3	60.3	187	197	94	102	20.05	18.80
	SC 10	63.3	62.8	65.3	65.8	187	209	102	105	17.80	24.10
	SC 122	64.0	64.0	66.3	67.0	171	196	86	99	11.10	19.61
	SC 128	61.8	62.3	64.0	64.8	173	192	85	96	10.28	19.93
	SC129	62.3	61.0	64.0	62.8	178	198	91	97	15.94	20.11
	SC 164	61.8	62.5	63.5	65.3	174	183	86	94	14.14	16.33
Jul. 15	SC 166	60.8	61.0	62.8	63.8	165	189	84	99	15.94	20.38
	SC 167	61.5	61.8	63.5	64.8	166	187	75	101	15.82	19.47
	SC168	62.8	61.0	65.0	63.3	174	185	88	100	15.59	20.58
	TWC321	63.3	63.0	65.0	65.8	170	206	86	102	14.81	24.17
	TWC324	63.3	63.3	64.8	65.8	179	210	90	106	13.54	23.16
	TWC329	63.0	61.5	64.8	64.8	175	204	83	103	13.97	19.60
	SC 10	63.5	64.0	66.5	67.3	178	187	90	95	16.48	16.17
	SC122	64.5	64.8	69.0	67.0	179	186	89	97	12.91	9.88
	SC128	61.8	64.0	64.8	68.3	175	181	81	89	10.70	12.78
	SC129	61.8	63.0	64.3	66.0	182	184	90	91	14.12	17.16
	SC 164	61.5	65.0	64.3	68.8	172	175	85	83	12.01	11.37
Aug. 1	SC 166	62.0	62.8	64.3	65.3	176	179	84	87	14.67	14.29
	SC167	62.8	64.3	65.5	67.5	175	179	83	88	15.57	14.14
	SC168	64.3	63.5	68.0	66.0	175	182	73	89	11.73	10.78
	TWC321	62.8	64.8	65.5	68.0	167	194	82	98	16.56	17.36
	TWC324	63.3	63.8	66.0	68.0	177	185	80	93	12.43	14.37
	TWC329	62.8	64.0	65.3	67.5	180	187	85	94	14.34	13.21
	SC 10	68.8	66.5	72.8	70.8	172	175	82	80	15.63	14.26
	SC 122	67.0	65.3	72.0	72.8	165	173	76	79	10.66	8.26
	SC 128	64.8	65.8	70.0	71.8	165	176	83	85	12.09	9.63
	SC129	63.0	64.0	65.5	68.8	176	173	85	83	13.60	12.05
	SC 164	64.5	64.3	68.0	68.3	171	163	87	78	13.62	10.50
Aug.15	SC 166	64.8	63.0	68.8	66.5	165	170	74	82	13.89	15.51
	SC 167	64.8	64.8	68.3	68.0	167	167	63	82	11.84	10.19
	SC168	66.5	64.8	70.0	68.5	166	171	69	75	13.29	12.72
	TWC321	64.0	66.3	67.3	70.3	170	178	74	84	12.97	13.64
	TWC324	67.3	66.0	70.0	70.8	178	179	81	89	12.46	12.42
	TWC329	65.3	65.8	67.8	71.8	181	180	85	88	12.30	12.95
L.S.D 0.05		1.2	1.03	1.1	1.41	9.2	8.74	8.2	NS	2.26	2.73

those obtained by Amer *et al.*, (2001) who found that delaying planting from June 16 to July 17 caused grain yield (ard/fed) reduction.

3.2. Hybrid Effect

The obtained results (Table 2) showed significant differences among the tested hybrids for all the studied traits. Considering the number of days from planting to 50% tasseling and silking, SC129 was the earliest hybrid in the two seasons but the difference between SC166 and SC129 was not significant in 2011 season, while SC10, SC 122, TWC321, and TWC 324 were the latest in flowering in both seasons, except for TWC 321 in the first season.

The data presented in Table (2) revealed that the differences among the tested hybrids were significant in the two growing seasons. Plant height ranged from 173 cm (SC166, SC167 and SC168) to 185 cm (SC10 and SC129) in the first season and from 179 cm (SC164) to 197 cm (SC10) in the second season. Therefore, SC10 was the tallest hybrid in both seasons, whereas SC164, SC167 and SC168 had the shortest plants in both seasons. Single cross 168 had the shortest ear height in the two seasons, while SC10 had the highest ear placement in both seasons. It could be noticed that SC10 had the tallest plants and the highest ear height in both seasons. In contrast, SC164, SC167 and SC168 had the shortest plants and SC168 had the shortest ear height in both seasons, respectively.

Concerning grain yield, SC10 surpassed all hybrids in 2010 while TWC 321 gave the highest grain yield in the second season. On the other hand, the lowest grain yield was obtained by SC128 in the first season and both SC122 and SC164 in the second season (Table 2). Significant hybrid differences among maize hybrids regarding grain yield and its attributes were realized by Khedr *et al.*, (1990) , Gouda *et al.*, (1998), Khalil (2007) and El-Galfy *et al.*, (2009).

3.3. Leaf blight infection

Regarding the response of hybrids to leaf blight disease infection under late planting natural conditions , SC122 and SC168 had the highest infection (34.2 and 30 %, respectively), while SC129 had the lowest leaf blight infection (15.8 %). Khalifa and Zein El-Abedeen (2000) showed that maize genotypes varied considerably regarding their resistance to leaf blight disease. Welz and Geiger (2000) indicated that infections with turcicum leaf blight were affected by climatical changes.

3.4. Hybrid x late planting date interaction effect

Interaction effects of planting date and maize hybrids on grain yield were significant as shown in Table 3. Concerning July 1st planting date, SC10 significantly surpassed all hybrids (27.68 ard/fed) in the first year , while SC168 had the highest grain yield(27.56 ard/fed) in the second year. On the second planting date (July 15th) in 2010 the highest yield was attained by SC10 (17.80 ard/fed), while in 2011 TWC321 was the highest in yield (24.17 ard/fed).

In the third planting date (August 1th), in 2010 the highest grain yield was obtained from SC10 and TWC321 (16.48, 16.56 ard/fed, respectively) while, SC129 and TWC 321 gave the highest yield (17.16 and 17.36 ard/fed) in the second season. On mid-Aug. planting, SC10 and SC166 gave the highest grain yield (15.63 and 13.89 ard/fed) in 2010 and (14.26 and 15.51 ard/fed) in 2011, respectively.

Finally, it could be concluded across the 4 late planting dates that SC10 was the most appropriate maize hybrid for late planting followed by TWC321 at Nubaria location. Response of maize hybrids to different planting dates was not similar, since SC129 produced high yield in planting dates of 1st July and 1st August, while SC166 gave high yield when planted either on 1st July or 15th August, whereas TWC 324 produced high yield on Jul.1st and Jul.15. The interaction among hybrids and late planting dates differed from one season to another (Table 3).

4. REFERENCES

Aly A. A. (1998). Response of some introduced maize inbred lines to planting dates. Zagazig J. Agric. Res. Vol. 25 (2): 211-221.

Amer E. A. El-Shenawy A. A. and Mosa H. E. (2001). Influences of planting dates and population densities under artificial and natural infections of common smut disease on some maize varities. J. Agric. Sci. Mansoura Univ., 26(8): 4673- 4679.

Amer S. M., Faisal R. I. I., Younis M. A. and Gouda,A.Sh. (1991). Response of some maize inbred lines to planting dates. Egypt.J.Appl.Sci. 6(10):277-284.

Bair W J., Gahen H.C. and Ayers J. E.(1990): Effect of time and rate of N side dress application on northern corn leaf blight severity and the associated yield loss. J.Prod. Agric. 3 : 44-49.

Bartlett M.S.(1937).Properties of sufficiency and statistical tests Proc of the Royal Statistical Society, Series A, 160, 268-282.

Dasilva P. R. F., Argenta G. and Rezera F. (1999). Response of irrigated corn hybrids to plant density in three sowing dates, Literature update on maize, CIMMYT. 5 (4):5.

El-Galfy A. M. K., Abdel-Azem M. E. M. and El-Mekser Hoda Kh. A. (2009). Response of some maize hybrids to late planting dates. Annals of Agric. Sci., Moshtohor, 47(2): 121–127.

Gouda A. Sh., Sultan M. A. and El-Zeir F. A. (1998). Response of some newly released white and yellow maize hybrids to planting dates. J. Agric. Sci., Mansoura Univ., 23 (3): 1013-1019.

Hassan M. M. M. (1999). Effect of planting dates on the response of the hybrids maize to nitrogen fertilization.M.Sc.Thesis,Fac.of Agric., Al-Azhar Univ. Egypt.

Ibrahim M. E., Esmail S.E. and Nawar A. A. (1995). Varietal response to nitrogen level and planting date and determination of the dependence structure in yellow maize yield using factor analysis. Zagazig J. Agric. Res. 22(2):329-347.

Khalifa K.I. and Zein El-Abedeen A. (2000). Turcicum leaf blight resistance in some Egyptian maize genotypes under surface and sprinkler irrigation systems. Egypt. J. Appl. Sci.15 (12): 410- 421.

Khalil M. A. G. (2007). Response of some white maize promising hybrids to planting dates- and nitrogen fertilization. Ph. D. Thesis, Fac. of Agric., Kafr El-Sheikh Univ., Egypt.

Khedr E.S.F., Matta S. E., Mahgoub G. M. and Sadek S. E. (1990). Effect of planting dates on growth and yield of some maize hybrids. Egypt. J. Appl. Sci. 5(8):792-800.

Nielson R. L., Thomison P. R., Brown G. A., Halter A. L. and Kirby L. W. (2002). Delayed planting effects on flowering and grain maturation of dent corn. U. S. A, Agron. J., Vol. 94(3): 549-558.

Noormohammadi Q., Siadat S .E. and Kashani E. (1997). Agronomy: First Volume: Cereal, 4th edition, .Shahid Chamra Univ. Press, Ahvaz, Iran, p. 446.

Norwood C. A. (2001). Planting date, hybrid maturity and plant population Effects on soil water depletion, water use and yield of dryland corn. U.S.A. Agron.J.,Vol.93 (5):1034-1042.

Sherif S. A., Zohary A. A. and Ibrahim S. T. (2005). Effect of planting dates and densities of maize intercropped with groundnut on growth, yield and yield components of both crops. Arab Univ. J .Agric. Sci., Ain Shams Univ. Cairo,13 (3): 771- 791.

Steel R. G. D. and Torrie J. H. (1980). Principles and procedures of statistics A biometrical approach 3rd.ed., Mc Graw- Hill Book Company, New York.

Tanaka A. and Hara T. (1971). Studies on the nutiophysiology of the maize plants .10: Grain Yields as affected by planting dates. Nippon Dojohiryogaku Zasshi, 42: 435-438. (C.F. Field Crop Abst. 27:5545, 1974).

Tefferi A. A., Hulluka M. and Welz H. G. (1996). Assessment of damage and grain yield loss in maize caused by northern leaf blight in Western Ethiopia. Zeitschrift fur pflanzen krankheiten und pflanzen schutz. 103: 353-363.

Welz H.G. and Geiger H.H.(2000). Genes for resistance to northern corn leaf blight in diverse maize populations. Pl. Breed. 119: 1-14.

Wiatrak P.J., Wright D. L., Mariois J. J. and Sprenkel R. (2004). Corn hybrids for late planting in the U.S Southeast. Agron. J.,Vol. 96(4):1118-1124.

تأثير مواعيد الزراعة المتأخرة على بعض هجن الذرة الشامية*

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ملخص

أقيمت تجربةحقلية بمحطة البحوث الزراعية بالنوبارية خلال عامى ٢٠١٠ و٢٠١١ لدراسة تأثير الزراعة المتأخرة (أول يوليو، منتصف يوليو، أول أغسطس، منتصف أغسطس) على صفات التزهير وارتفاع النبات وارتفاع الكوز ومحصول الحبوب ومرض تبقع الأوراق لبعض هجن الذرة الشامية، حيث تم زراعة أحد عشر هجينا هى: هجين فردى

١٠، ١٢٢، ١٢٨، ١٢٩، ١٦٤، ١٦٦، ١٦٧، ١٦٨والهجن الثلاثية ٣٢١، ٣٢٤، ٣٢٩ ، وكان تصميم التجربة هو قطاعات كاملة العشوائية مرتبة فى قطاعات غير كاملة فى أربع مكررات داخل موعد الزراعة.أوضحت النتائج وجود فروقا معنوية بين هجن الذرة الشامية فى استجابتها للتأخير فى موعد الزراعة، حيث أدى تأخير موعد الزراعة بعد ١٥ يوليو إلى زيادة عدد الأيام من الزراعة حتى ظهور ٥٠% من النورات المذكرة والمؤنثة وإنخفاض إرتفاع النبات والكوز. حدث نقص معنوى فى محصول الحبوب كمتوسط لجميع الهجن بنسبة٤٢.٤%فى الموسم الأول و ٥١.٢% فى الموسم الثانى عند تغير ميعاد الزراعة من ١ يوليو إلى ١٥أغسطس . تفوق هجين فردى ١٠ فى عام ٢٠١٠ معنويا على جميع الهجن الأخرى فى إنتاج الحبوب حيث أعطى أعلى غلة(١٩.٤٠ أردب/فدان)، بينما تفوق الهجين الثلاثى ٣٢١ على باقى الهجن الأخرى فى عام ٢٠١١ (٢٠.٣٦ أردب/فدان) يليه هجين فردى١٠ (١٩.٢٣ أردب/فدان). على الجانب الأخر كان الهجين الفردى ١٢٨ أقل الهجن محصولا فى كلا العامين حيث أعطى ١٣.٤٤ أردب/فدان، بينما كان الهجين الفردي ١٢٢أقل الهجن غلة(١٥.٧٨ أردب/فدان) فى العام الثانى على الترتيب. أظهرت النتائج أن أعلى نسبة إصابة بمرض تبقع الأوراق تحت ظروف العدوى الطبيعية كانت عند الزراعة فى أول أغسطس(٢٩.٥%) بينما كانت أقل نسبة اصابة عند الزراعة فى ١٥ أغسطس (١٨.٤%) كمتوسط لكل الهجن .كان أعلى الهجن اصابة بهذا المرض تحت ظروف الزراعة من أول يوليو حتى منتصف أغسطس هو هجين فردى ١٢٢(٣٤.٢%) بينما كان أقلها إصابة (الأكثر مقاومة للمرض) هو هجين فردى ١٢٩ (١٥.٨%). كان التفاعل بين الهجن المنزرعة و مواعيد الزراعة معنويا فى جميع الصفات المدروسة فيما عدا صفة إرتفاع الكوز فى الموسم الثانى فقط . يتضح من هذه الدراسة أن هجين فردى ١٠ كان أقل الهجن تأثرا بتأخير ميعاد الزراعة وأعطى أعلى غلة من الحبوب يتبعه هجين ثلاثى ٣٢١و هجين فردى ١٦٦. وبناءا على ذلك يمكن التوصية بزراعة هذه الهجن تحت ظروف الزراعة المتأخرة في منطقة النوبارية. كما يمكن التوصية بزراعة الهجين الفردى ١٢٩ فى المواعيد المتأخرة فى المناطق التى تظهر بها اصابات بمرض تبقع الأوراق(شمال وشمال غرب الدلتا).

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