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EFFECT OF PLANTING DATES ON THE GROWTH AND GRAIN YEILD OF 15 MAIZE HYBRIDS AT NORTH AND MIDDLE EGYPT

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ABSTRACT

Four field experiments were conducted at Sakha (North Egypt) and Mallawy (middle Egypt) Agric. Res. Stn. during 2010 and 2011 seasons. The aim was to study the effect of planting dates on the growth and grain yield of 15 maize hybrids, *i.e*. SC 10, SC 122, SC 123, SC 124, SC 128, SC 129, SC 162, SC 164, SC 166, SC 167, SC 168, TWC 310, TWC 311, TWC 314 and TWC 324 at north and middle Egypt. Four planting dates (1st May, 15th May, 1st June and 15th June) were used. Combined analysis across four planting dates was used in both locations and years. Results showed that first May planting at Sakha location and mid May planting at Mallawy locations produced the highest values of plant and ear height and grain yield, whereas late planting on 15th June produced the lowest values at Sakha and 1st May at Mallawy in both seasons for these traits. The number of days from planting to tasseling and silking decreased as the date of planting was delayed. The tested maize hybrids varied significantly in the growth and grain yield characters. SC128 reached flowering stage earlier than all hybrids at both locations and years, while, SC10 was the highest for plant and ear heights and grain yield at both locations and years, except for grain yield at Sakha location in 2011 season. The highest hybrids for grain yield under each planting date at Sakha location were SC162 (1st May, 1st June and 15th June) and SC128(15th May), while at Mallawy location were SC10 (15th May, 1st June and 15th June) and TWC (1st May).

Key words: *environmental conditions, hybrids, locations, maize, planting date.*

1. INTRODUCTION

Maize (*Zea mays* L.) is one of the most important cereal crops in Egypt and the world. It ranks the third, surpassed only by wheat and rice. In Egypt, it is necessary to increase maize yield to face the wide gap between the production (5.682 MT per year) and consumption (9.130 MT per year). High maize production can be achieved by improving cultural practices and planting the promising hybrids. Planting date is among the major cultural practices. Planting date is the most limited factor for maize production because, it is correlated by environmental conditions, *i.e.*, air and soil temperature, solar radiation, relative humidity, insects and disease infections. Planting date is one of the most important aspects of management in the agricultural system which can affect yield through influencing emergence date, plant density, normal growth, and pollination and maturity date (Noor Mohammadi *et al.,* 1997). Determination of the optimum planting date for maize is very crucial for better crop yield. Seed planting in a suitable date results in root development, increment of plant tolerance against stresses and maize growth cycle completion and finally yield increase (Dasilva *et al*., 1999). Grain yield is a complex character determined by several components which reflect positive or negative effects upon this trait. Meanwhile, it is important to examine the contribution of each of the various components in order to consider the ones which have the greatest influences on yield (Özer *et al*. 1999). Norwood (2001) suggested that farmers should plant on more than one planting date in order to safeguard against unpredicted seasons. Gouda *et al*. (1998) reported that significant improvement of maize productivity has been achieved by planting high yielding hybrids suited for summer season (mid May to mid June), but this is favorable in some governorates of Egypt . Growers plant maize before or after summer crops and growers plant maize repeatedly in the same season. El Galfy *et al*. (2009) found that delaying planting dates significantly decreased the number of days from planting to 50 % tasseling and silking, plant height, ear height and grain yield. Maryam *et al*. (2011) reported that determination of the optimum planting date for

maize is very crucial for better crop yield. The present study was conducted to evaluate the effects of planting date on growth characters and grain yield of maize hybrids and to compare the efficiency and profitability of different selection indices in selecting the best genotypes and planting dates.

2. MATERIALS AND METHODS

Field experiments were conducted at Sakha (Northern zone) and Mallawy (Central zone) Res. Stn., Field Crops Res. Inst., ARC, Egypt during 2010 and 2011 seasons. Fifteen maize hybrids; six white single crosses (SC 10, SC 122, SC 123, SC 124, SC 128 and SC 129), five yellow single crosses (SC 162, SC 164, SC 166, SC 167 and SC 168) and four white three way crosses (TWC 310, TWC 311, TWC 314 and TWC 324) were evaluated under four planting dates (1^{st} May, 15^{th} May, 1^{st} June and 15^{th} June). A randomized complete block design with four replications arranged in incomplete blocks where replications were nested within planting dates. Each plot consisted of four rows, with two outer rows as borders and the two middle rows for grain yield. Each row was 6 m in length and 80 cm width. Two seeds were planted per hill, 25 cm apart. Recommended doses of super- phosphate and potassium fertilizers (30Kg P_2O_5 and 24Kg K_2O fed^{-1}) were applied during land preparation. Whereas, nitrogen fertilizer (urea 46%) was applied at a rate of 120Kg N fed^{-1}in two equal doses before the first and second irrigations. Air and soil temperature and solar radiation were recorded for April, May, June, July, August, September and October (Table 1). The traits studied were: number of days from planting to 50% tasseling and silking, plant and ear heights (cm), and grain yield.

Plant and ear heights (cm) were measured from ground surface to the end node of the tassel and the highest ear- bearing node, respectively. Grain yield: ears of the two inner rows of each plot were weighed, shelled, and adjusted to 15.5% moisture. Grain yield is expressed in ardab per feddan (one ardab = 140kg and one feddan = $4200m^2$). Statistical analysis within years at each location and combined analysis for grain yield for over years within locations were done according to (Steel and Torrie 1980), after homogeneity test of residual variance for all trails according to Bartlett (1937).

3. RESULTS AND DISCUSSION

3.1. Environmental conditions

Means of air and soil temperatures and solar radiation varied among planting dates at Sakha and Mallawy Agric. Res. Stn. during 2010 and 2011 seasons (Table1). The data showed that planting dates differed in air and soil temperatures, and solar radiation. Air and soil temperatures as well as solar radiation increased as planting date delayed at vegetative growth periods, but decreased as planting date delayed at filling periods. Moreover, where air and soil temperatures and solar radiation were higher at Mallawy than Sakha and in 2010 than 2011 seasons. These differences were reflected in growth and grain yield of maize plants.

3.2.Effect of planting date

Number of days to 50% tasseling and silking were significantly affected by planting date (Table 2). Number of days to 50% tasseling and silking appeared significantly higher for early planting during May compared with June planting. Planting maize on June 15 was associated with the lowest number of days from planting to 50% tasseling and silking at Sakha and Mallawy in both growing seasons. These results may be due to cool weather (Table1) which slowed early development in the early planting (Cirilio and Andrade, 1994) and may be due to shortening photoperiod, and decrease in difference between day and night temperature at late planting dates (Ibrahim *et al.*, 1995, Aly,1998, Gouda *et al*.,1998 and Khalil,2007).

Plant and ear heights were significantly affected by planting date in both seasons and locations, except for plant and ear heights at Sakha location in 2010 season. Data in Table (2) showed that plant and ear heights decreased as planting date delayed from May 1 to June 15 in Sakha location in 2011 season only, while at Mallawy location, the highest values were recorded on May 15, and the lowest values for plant and ear heights were linked with May 1 in both seasons. These differences might be attributed to weather conditions prevailing during maize growth particularly, temperature, light duration and intensity. These results are in agreement with Sherif *et al*. (2005), Aly (1998), Gouda *et al*. (1998) and Khalil (2007).

Grain yield was significantly affected by planting date in both seasons and locations. Grain yield of maize hybrids significantly decreased as a result of delaying planting after the first of May at Sakha. While, the results exhibited that planting date on May 15 at Mallawy had the highest grain

Table (1): Monthly maximum, minimum and mean of air temperature, soil temperature, and solar radiation at Sakha and Mallawy in 2010 and 2011 seasons.

Month	Air temperature						Soil temperature		Solar radiation	
	2010			2011						
	Sakha location									
	Max.	Min.	Mean	Max.	Min.	Mean	2010	2011	2010	2011
Apr.	27.5	13.0	20.3	26.5	10.4	18.6	21.5	18.5	22.1	20.3
May	30.5	16.0	23.3	32.4	16	24.0	23.0	23.5	25.4	26.1
June	33.0	20.0	26.5	32.3	18.5	25.4	25.8	24.8	28.9	25.4
July	34.3	21.0	27.7	34.5	20.7	27.6	27.0	27.2	30.0	30.1
Aug.	35.0	21.7	28.4	34	19.4	26.7	28.5	27.5	31.0	29.1
Sep.	34.7	19.3	27.0	32.2	17.2	24.7	26.7	25.4	29.4	26.9
Oct.	28.7	16.0	22.4	26.8	12.3	19.5	22.5	20.3	24.4	31.6
	Mallawy location									
Apr.	32.8	14.5	23.7	30	13.5	21.8	24.6	22.6	25.1	23.1
May	35.5	17.9	26.7	30.5	17.8	24.2	27.2	24.7	28.3	25.7
June	38.1	21.3	29.7	35.8	20.2	28.0	30.3	28.6	31.5	29.7
July	36.2	23.2	29.7	33.7	19.5	26.6	31.0	27.1	31.5	28.2
Aug.	37.6	24	30.8	36.1	21.0	28.6	31.7	29.5	32.6	30.3
Sep.	35.2	20.7	28.0	33.8	19.7	26.7	28.8	27.5	29.7	28.3
Oct.	33.8	22.5	28.2	31.6	16.2	23.4	29.0	24.1	29.9	24.8

Table (2): Effect of planting date on days to 50% tasseling, days to 50% silking, plant height, ear height and grain yield at Sakha and Mallawy in 2010 and 2011 growing seasons.

Planting date	Days to 50% tassiling		Days to 50% silking		Plant height (cm)		Ear height (cm)		Grain yield (ard fed^{-1})	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
	SK									
May 1st	66.5a	68.2a	67.1a	68.3a	297.4	305.9a	168.2	177.4a	37.40a	42.54a
May15th	65.1b	62.7b	65.6b	63.2b	302.1	305.8a	184.5	176.7b	35.42b	41.28b
June 1st	58.9c	61.4c	58.9c	62.6c	306.5	275.8b	190.6	149.9c	34.40b	32.72c
June15th	57.0d	58.8d	56.9d	59.5d	302.4	269.3b	179.4	149.9c	31.29c	30.63d
F test	**	**	**	**	NS	**	NS	**	**	**
					Mall					
May 1st	63.7a	66.2a	64.7a	67.9a	236.0d	235.1b	138.9bc	126.5c	30.78d	30.34c
May15th	59.1b	60.7c	60.4b	62.3c	289.7a	253.4a	161.8a	146.3a	40.06a	36.49a
June 1st	57.2c	61.9b	58.1c	63.8b	264.2b	252.7a	143.7b	144.1a	37.01b	32.84b
June15th	56.8c	56.9d	57.9c	58.6d	247.7c	248.8a	136.0c	136.4b	34.60c	33.30b
F test	**	**	**	**	**	**	**	**	**	**

*,** and N.S indicate P< 0.05, P< 0.01and not significant, respectively. Vertical means, within location, with the same letter (s) are not significantly different at 0.05 level according to Duncan's multiple range test

environmental conditions that changed clearly such as planting date and locations. Otegui and Melon(1997) and Khalil (2007),stated that delaying planting date strongly decreased dry matter partitioning to grain. Mosa *et al*. (2012) found that planting date (15th May) gave the highest grain yield at Sakha and Mallawy, meanwhile the lowest grain yield was at planting date (15th June) at Sakha location and (1stMay) at Mallawy location.

3.3. Effects of hybrids

Highly significant differences among hybrids were found in the number of days from planting to 50% tasseling and silking (Table 3). Hybrid SC 128 was the earliest one in terms of days to 50% tasseling and silking at Sakha and Mallawy in both seasons, while SC162 and SC10 were the latest hybrids at Sakha and Mallawy locations in yield in both seasons, respectively. These differences among hybrids may be due to differences in the genetic make up of evaluated

Table (3):Effect of hybrids on days to 50% tasseling and days to 50% silking at SK and Mall in 2010 and 2011 growing seasons.

Hybrids	Days to 50% tassiling				Days to 50% silking			
	SK		Mall		SK		Mall	
	2010	2011	2010	2011	2010	2011	2010	2011
SC 10	62.7c	64.3b	61.3a	62.6b	62.3e	64.7c	62.3a	64.1b
SC 122	61.1h	62.8d	58.8ef	61.6ef	61.4g	63.0f	59.8de	63.0g
SC 123	62.3de	62.6de	59.8bc	62.0d	62.3e	63.0f	60.8c	63.6cd
SC 124	61.3h	62.0f	60.0b	59.9g	61.5g	62.3g	61.3b	61.5h
SC 128	59.4j	60.4h	57.2h	59.0i	59.5i	61.3i	58.5g	60.5j
SC 129	59.8i	60.7g	58.8ef	59.5h	60.3h	61.7h	60.0d	60.9i
SC 162	63.6a	64.5a	59.7bcd	63.4a	63.6a	65.0b	60.6c	65.3a
SC 164	61.3h	62.5e	58.5fg	61.3f	62.0f	63.0f	59.6ef	62.9g
SC 166	62.5cd	62.8d	59.4d	61.5ef	63.3b	63.5e	59.9de	63.3ef
SC 167	61.7g	62.7de	59.5cd	62.1cd	62.2ef	63.4e	60.5c	64.1b
SC 168	62.5cd	62.5e	59.0e	61.3f	62.9cd	63.0f	60.5c	63.1fg
TWC310	62.6c	63.4c	58.8ef	61.6e	62.8d	64.1d	60.0d	63.3ef
TWC311	62.1ef	62.6de	58.9e	61.6e	62.4e	63.0f	59.8e	63.4cd
TWC314	62.0	63.4c	58.3g	62.0d	62.4e	64.5c	59.4f	63.7c
TWC324	63.0b	64.3b	59.6cd	62.3c	63.1bc	65.4a	60.6c	64.3b
F test	**	**	**	**	**	**	**	**

*,** and N.S indicate P< 0.05, P< 0.01and not significant, respectively. Vertical means, within location, with the same letter (s) are not significantly different at 0.05 level according to Duncan's multiple range test

hybrids, (Eisa 1998, Gouda *et al*. 1998, and Khalil,2007). Significant differences were detected among hybrids in plant and ear height in both seasons and the two locations (Table 4). Hybrid SC10 had the tallest plants and the highest ear heights, while, SC128 and SC167 were the shortest plants and ear heights in comparison with the other hybrids at Sakha and Mallawy locations in both years. Differences in plant and ear height amang maize hybrids under study may be due to differences in their genetic make up to stress condition and environmental factors affecting developmental processes and ability to survival and uptake of the available nutrients which led to an increase in plant and ear height. Results are in harmony with those obtained by Nofal *et al*. (2005), Mohamed (2004) and Al-Ahmed *et al*.(2004).

Data in Table(5) indicated highly significant differences between maize hybrids in grain yield per feddan. The differences between these hybrids may be attributed to the genetic differences among hybrids, which play an important role for the uptake of the available nutrients and the photothynthesis processes, which led to increase of dry matter production. Similar results were obtained by Costa *et al*. (2002),El-Aref *et al*.(2004), Waitrarak (2004) and Sadek and Barkat (2006). The highest hybrids for grain yield per feddan was recorded for SC 10 followed by TWC324, SC129 and SC162 in 2010 season and SC162, SC167, SC168,SC129 and SC128 in 2011season at Sakha location. Meanwhile, the highest hybrids for grain yield were SC10, TWC311, and SC129 in both seasons. Hybrid SC10 was the most superior compared with the other hybrids. This may be attributed to its taller plants with higher ear height. Awad *et al*. (1993) found that each increase of 1 cm in plant height led to an increase of about 24.62kg/fed.

3.4. Planting date x hybrid interaction

Grain yield per feddan was significantly affected by the interaction between planting date and hybrids as combined between both seasons at both locations (Table 6). The highest hybrids for grain yield were SC128 (May 15) and SC10 (May 15) at Sakha and Mallawy, respectively, while the lowest hybrids were TWC311 (June 15) and SC162 (May 1) at Sakha and Mallawy, respectively. In each planting date, the highest values of grain yield per feddan of white and yellow single crosses and three way crosses, respectively were SC10, SC162 and TWC324 at Sakha location and SC10, SC166 and TWC311 at

Table (4): Effect of hybrids on plant and ear height at SK and Mall in 2010 and 2011 growing seasons.

Hybrids	Plant height(cm)				Ear height(cm)			
	SK		Mall		SK		Mall	
	2010	2011	2010	2011	2010	2011	2010	2011
SC 10	325.4a	310.2a	267.1ab	263.6a	196.6a	176.6a	149.1a	147.5a
SC 122	299.4f	281.5g	255.1f	239.0ij	185.5b	161.5fg	145.6cde	137.3gh
SC 123	307.7d	296.4de	264.8bc	249.3f	182.1cd	166.6cd	145.1def	139.6e
SC 124	300.7f	280.3gh	259.4ef	243.3g	179.1e	160.8g	146.0cde	137.6fg
SC 128	286.9h	278.5hi	247.0g	240.0hi	162.0g	148.0i	132.5g	127.5j
SC 129	308.9d	308.8a	260.4de	255.5d	180.3de	171.5b	143.8ef	142.0d
SC 162	314.5c	291.1f	264.0bc	257.9c	186.2b	163.6ef	146.5bcd	144.4bc
SC 164	290.8g	276.8ig	254.3f	232.3k	173.2f	160.3g	148.0abc	133.4i
SC 166	288.3h	274.3jk	252.6f	237.3j	171.9f	156.0h	142.9f	133.3i
SC 167	284.1i	271.4l	255.8f	231.9k	172.3f	156.0h	145.0def	128.2j
SC 168	287.1h	271.9kl	253.3f	241.2h	171.6f	160.2g	145.8cde	135.7h
TWC310	309.6d	298.5de	264.9bc	260.1b	184.3bc	165.3de	148.6ab	146.1ab
TWC311	308.3d	300.3c	261.5cde	251.5e	184.4b	172.6b	144.1def	139.5e
TWC314	303.1e	295.1e	263.0cd	250.1ef	184.1bc	165.3de	144.1def	139.3ef
TWC324	316.7b	303.8b	270.1a	259.0bc	195.1a	167.6c	149.1a	143.5cd
F test	**	**	*	**	**	**	*	**

*,** and N.S indicate P< 0.05, P< 0.01and not significant, respectively. Vertical means, within location, with the same letter (s) are not significantly different at 0.05 level according to Duncan's multiple range test

Table (5): Effect of hybrids on grain yield at SK and Mall in 2010 and 2011 growing seasons.

Hybrids	Grain yield (ard/fed)			
	SK		Mall	
	2010	2011	2010	2011
SC 10	37.83a	37.51d	37.08	37.94a
SC 122	35.75cd	35.03h	34.72	31.38hi
SC 123	34.18fg	37.15de	35.25	30.37j
SC 124	34.30fg	34.37i	36.93	30.93i
SC 128	35.14e	38.22c	33.21	35.24c
SC 129	36.54b	38.57bc	37.11	35.30c
SC 162	36.05bc	40.34a	35.82	31.60gh
SC 164	35.43de	36.74ef	35.47	32.44ef
SC 166	34.49f	36.01g	34.17	33.55d
SC 167	33.81gh	38.86b	35.96	33.42d
SC 168	31.82j	38.58bc	35.41	33.86d
TWC310	32.53i	32.34j	34.94	32.69e
TWC311	30.62k	36.45fg	37.12	35.83b
TWC314	33.48h	34.92hi	34.72	32.02fg
TWC324	37.44a	36.76ef	36.21	32.05fg
F test	**	**	NS	**

*,** and N.S indicate P< 0.05, P< 0.01and not significant, respectively. Vertical means, within location, with the same letter (s) are not significantly different at 0.05 level according to Duncan's multiple range test

Table (6): Planting date X hybrids interaction of yield at SK and Mall (combined average).

Planting date								
Hybrid	Sakha				Mallawy			
	May 1	May 15	Jun1	Jun15	May1	May 15	Jun1	Jun15
SC10	40.63d	41.30 c	34.66qr	34.10 st	33.11 rst	42.74a	37.11fg	37.10fg
SC 122	39.14h	38.52ij	32.89 w	31.02y	27.92 z	39.11d	34.14no	31.06yz
SC 123	37.40m	38.94hi	33.67uv	32.67wx	27.77 z	34.94l	34.12no	34.43mn
SC 124	35.65o	39.75 g	32.32x	29.65z	32.01 vw	38.12e	34.79lm	30.82z
SC 128	38.54ij	43.24 a	34.00tu	30.95y	29.75 z	40.21c	36.34hi	30.61z
SC 129	40.00efg	41.09 c	34.94pq	34.22 st	31.72wx	39.27d	36.75gh	37.10fg
SC 162	42.19b	40.05 fg	35.63 o	34.95pq	26.36 z	37.16fg	35.68jk	35.67jk
SC 164	40.03efg	38.55 ij	35.04pq	30.75y	29.54 z	38.00e	33.86op	34.42mn
SC 166	41.07c	38.03 kl	33.33 v	28.58z	32.36 uv	38.16e	33.47prq	31.47xy
SC 167	41.48c	40.27 def	35.14 p	28.47z	29.71 z	37.41f	36.68gh	34.97l
SC 168	39.95fg	37.85 kl	33.64uv	29.36z	30.35 z	41.15b	34.26no	32.80tu
TWC 310	37.70lm	33.30 v	30.34 z	28.43z	31.47 k	34.89l	32.75tu	36.16i
TWC311	38.22jk	36.37 n	32.40 x	27.17z	35.45 jk	39.49d	34.92l	36.06ij
TWC 314	37.72lm	37.29 m	30.99 y	30.83y	30.94 z	35.64jk	33.31qrs	33.61pq
TWC 324	40.42de	40.22def	34.47rs	33.32v	29.96 z	37.89e	35.71jk	32.98st

Means in the same column designated by the same letter are not significantly different at 0.05 level according to Duncan's multiple range test

Mallawy location in May 1, SC128, SC167 and TWC324 at Sakha location and SC10, SC168 and TWC311 at Mallawy location in May 15, SC129, SC162 and TWC324 at Sakha location and SC10, SC167 and TWC324 at Mallawy location in June 1, and SC10 , SC129, SC162 and TWC324 at Sakha location and SC10, SC129, SC162 and TWC310 at Mallawy location in June 15. (Shafshak *et al*. (1995, Lauer(1999), Mahfouz, (2004) and Khalil (2007) found that the interaction between planting date and hybrids was significant for grain yield.

On the other hand, no significant interactions between planting date and hybrids were found on the other traits in the two seasons.

It could be concluded that the best planting dates for grain yield were May1 and May15 at Sakha and Mallawy, respectively.The best hybrids for grain yield were SC162 in May 1, June 1 and June 15 and SC128 in May 15 at Sakha location and TWC 311 in May 1 and SC10 in May 15, June 1 and June 15 at Mallawy location.

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تأثير ميعاد الزراعة على نمو ومحصول 15 هجين من الذره الشامية فى شمال ووسط مصر

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ملخص

أقيمت أربعة تجارب حقلية بمحطة بحوث سخا فى شمال مصر ومحطة بحوث ملوى فى مصر الوسطى خلال موسمي 2010و2011 لدراسة تأثير مواعيد الزراعة على نمو و محصول خمسة عشر هجين من الذرة الشامية وهى هـ.ف-10 ، هـ.ف-122 ، هـ.ف-123 ، هـ.ف-124 ، هـ.ف- 128 ، هـ.ف-129، هـ.ف-162 ، هـ.ف-164 ، هـ.ف-166 ، هـ.ف-167 ، هـ.ف- 168 ، هـ.ث310 ، هـ.ث311 ، هـ.ث314 ، هـ.ث324. استخدم تصميم القطاعات كاملة العشوائية فى أربعة تكرارات لكل ميعاد من مواعيد الزراعة و هي أول ومنتصف مايو وأول و منتصف يونيو.وتم عمل التحليل المشترك للأربع مواعيد في كلا الموقعين و السنتين.أوضحت النتائج أن موعد أول مايو في سخا ومنتصف مايو فى ملوي حققا أعلى النتائج فى ارتفاع النبات وارتفاع الكوز ومحصول الحبوب، بينما حقق ميعاد منتصف يونيه أقل النتائج لذات الصفات في سخا، و ميعاد أول مايو في ملوي في كلا الموسمين. كما انخفض معنو يا عدد الأيام للوصول إلى 50% لقاح وحريره مع التأخير في ميعاد الزراعة. أوضحت النتائج وجود اختلافات معنوية بين الهجن لكل من صفات النمو الخضري و غلة الحبوب.وكان هـ.ف- 128هو أسرع الهجن في التزهير في كلا الموقعين و السنتين، بينما كان هـ.ف- 10أعلى الهجن فى ارتفاع النبات و الكوز و المحصول فى كلا الموقعين و السنتين ما عدا سخا في موسم 2011 . كان أعلى الهجن فى محصول الحبوب عند كل ميعاد زراعة فى سخا هو هـ.ف- 162فى أول مايو و أول و منتصف يون يو و هـ.ف- 128لميعاد منتصف مايو، بينما كان هـ.ف-10أعلى الهجن فى محصول الحبوب لمواعيد منتصف مايو و أول و منتصف يونيه وهـ.ث 311 لميعاد أول مايو و ذلك فى ملوى.

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