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RESPONSE OF SOME MAIZE CULTIVARS TO NITROGEN FERTILIZATION UNDER TWO FARMING SYSTEMS

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Two field experiments were carried out at Agric. Res. Stat., Fac. Agric.,Cairo Univ., during 2000 and 2001 seasons to study the effect of nitrogen fertilizer levels on growth, yield and yield components of some maize cultivars under two farming systems. Data revealed that number of days to emergence, plant height, ear height, yield and its components of no- tillage system (NT) were lower than those of conventional system (CT). Increasing N level from 80 to 110 or 140 kg / fad significantly delayed tasseling and silking. Application of 140 kg N/fad increased grain yield/ fad, over the 80 and 110 kg N/ fad by 42.76 and 10.81% in the first season and by 39.60 and 9.61% in the second season, respectively. Both single cross 10 and three-way cross 310 hybrids surpassed the open pollination cultivar Giza 2 for plant height, ear height, number of leaves / plant and ear leaf area. While, Giza 2 cultivar was the earliest in tasseling and silking. SC 10 hybrid exceeded TWC 310 hybrid and Giza 2 cultivar in grain yield /fad by 5.51 and 15.49% in the first season and 5.61 and 14.51% in the second one, respectively. SC10 produced greatest ear leaf area under the conditions of CT system and 140 kg N / fad. Under the condition of CT system SC 10 hybrid with 110 kg N/ fad or 140 kg N/ fad produced highest grain yield / fad. It could be concluded that SC10 is the best studied cultivar and could be produce greatest grain yield under the CT system with 110 kg N/ fad. However, under no-tillage system, the highest grain yield was obtained with growing SC 10 and 140 kg N / fad.

Keywords: Maize; *Zea mays* L.; tillage system; nitrogen levels; cultivars.

إستجابة بعض أصناف الذرة الشامية للتسميد الآزوتي تحت نظامين للزراعة

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أقيمت تجربتان حقليتان بمحطة التجارب والبحوث الزراعية بكلية الزراعة – جامعة القاهرة بالجيزة لدراسة تأثير مستويات التسميد الآزوتي (٨٠ ، ١١٠ ، ١٤٠ كجم ن / الفدان) علي النمو والمحصول ومكوناته لبعض أصناف الذرة (هجين فردي ١٠ ، هجين ثلاثي ٣١٠، الصنف المفتوح التلقيح جيزة ٢) تحت نظامين للزراعة (الخدمة التقليدية ، عدم الخدمة).وتوضح النتائج :

1- إن نظام عدم الخدمة أعطي أقل القيم بالنسبة لكل من عدد الأيام حتى الإنبات ، طول النبات وارتفاع الكوز والمحصول ومكوناته بالمقارنة بنظام الخدمة التقليدية .

٢- زيادة مستوي التسميد الآزوتي من ٨٠ إلي ١١٠ أو ١٤٠ كجم ن / الفدان آخر تاريخ ظهور النورة المذكرة والمؤنثة معنويا حيث طالت فترة النمو الخضري مع الجرعة العالية من التسميد الآزوتي ١٤٠ كجم ن / الفدان . أدي إضافة ١٤٠ كجم ن / الفدان إلي زيادة محصول الحبوب بمقدار ٤٢,٩٥ ، ١٠,٨١ % في الموسم الأول ، ٣٩,٦٠ ، ٩,٦١ % في الموسم الثاني مقارنة بإضافة ٨٠ أو ١١٠ كجم ن / الفدان علي الترتيب.

٣- تفوقت الهجن (الفردية ، الثلاثية تحت الدراسة) علي الصنف مفتوح التلقيح (جيزة ٢) في كلا من ارتفاع النبات والكوز وعدد الأوراق علي النبات ومساحة ورقه الكوز بينما كان الصنف جيزة ٢ أكثر تبكيراً للنورة المذكرة والمؤنثة مقارنه بالهجن تحت الدراسة .أنتج الهجين فردي ١٠ محصول حبوب أكثر من الهجين الثلاثي ٣١٠ ، الصنف جيزة ٢ بمقدار ٥,٥١ ، ١٥,٤٩ % في الموسم الأول، ٥,٦١ ، ١٤,٥١% في الموسم الثاني علي الترتيب .

٤- الهجين الثلاثي ٣١٠ كان أكثر تبكيرا عندما زرعت النباتات بنظام عدم الخدمة مع أضافه ٨٠ كجم ن / الفدان . وأعطي الهجين الفردي ١٠ أكبر مساحة لورقة الكوز عندما زرع تحت نظام الخدمة التقليدية مع إضافة ١٤٠ كجم ن / الفدان . أعطي الهجين فردي ١٠ عندما زرع تحت نظام الخدمة التقليدية مع أضافه ١١٠ أو ١٤٠ كجم ن / الفدان أعلي محصول حبوب / الفدان وبينما أعطي تحت نظام عدم الخدمة أعلى محصول مع ١٤٠ كجم ن/ الفدان دون فروق معنوية.

INTRODUCTION

Maize (*Zea mays* L.) is one of the most important cereal crops in the world. It ranks third among the world cereal crops after wheat and rice.

In Egypt, maize is an important crop for human consumption, animal feeding and starch industry. Shortage in the production of cereals including maize is generally considered as an economic and social problem. Recently, there are many efforts to increase production of cereals mainly through crop rotation and new farming systems. Due to the limited cultivable area in Egypt, it is imperative to follow a multicropping systems, in which the same area would be planted two or there times yearly, therefore, cut off the time required for seedbed preparation may be become necessary.

No-tillage crop production appears as an attractive practical production system, which would minimize efforts and costs. Pierce *et al.* (1992) noticed that it was possible that decrease in no – tillage yield compared with other tillage systems might appear only as a result of specific weather patterns during specific maize development stage. Hughes *et al*. (1992) concluded that zero– tillage may be unsuitable for heavier textured soils due to restricted root development. Kitur, *et al.* (1994) reported that maize yield was 8.4 t / ha. in no – tillage and 9.3 t / ha. in conventional tillage in 1989 season, but in 1991 it was not significantly affected by cultivation treatments. Sherif *et al*. (1995) found that no- tillage treatments reduced grain yield as compared with conventional tillage. Wilhelm *et al*. (1991) found that tillage practice had a significant effect on plant emergence and on dry matter production. Norwood and Currie (1998) found that maize yields were increased by reduced tillage and no–tillage in 3 out of 4 years whereas they increased sorghum yields in only 1 year. Norwood (1999) found that No– tillage increased yields of maize in three years, of sorghum and sunflowers in two years, and of soybeans in one year. Maize had the greatest yield response to no- tillage averaging 31 %.

Smart and Bradford (1999) found that the conservation tillage systems (RT and pre sowing no- tillage PPNT) resulted in greater economic returns of corn, compared with CT tillage system, due to both greater yields in dry years and lower production costs in all years.

Concerning N application, growth characters of corn were not significantly affected while, number of days to 50 % tasseling and silking, grain yield and yield components were positively affected by increasing the rate of nitrogen fertilizer (Matta *et al*., 1990; Gouda *et al.,* 1992; EL–Sheikh, 1993; Shafshak *et al*.,1994; Hammam,1995; Moshtohory *et al*.,1995; EL-Gezawy, 1996 and EL-Habbak and Shams EL- Din, 1996). Burgos *et al*. (1989) found that flowering dates of corn differed between cultivars but were not affected by fertilizer rates. EL- Habbak (1996) found that application of 130 kg N/fad increased grain yield/ fad over the 90 and 110 kg N/ fad level by 26.96 and 5.66% in the first season and 8.29 and 2.95 % in the second season, respectively.

Many researchers have shown that maize hybrids proved to be one of the most efficient tools for raising maize yield (Hassan, 1995; EL- Gezawy, 1996; EL- Habbak,1996 and EL- Habbak and Shams EL- Din,1996). The variation between maize cultivars in growth, grain yield and yield component are also reported by the previous researchers. Reddy and Khera, (1999) found that significant cultivar differences in response of maize and sunflower to fertilizer rate and plant density.

The aim of this investigation was to study the response of some maize cultivars to, nitrogen fertilizer levels under conventional tillage and no-tillage farming systems.

MATERIALS AND METHODS

Two field experiments were carried out at Agric. Res. Stat., Fac. Agric., Cairo Univ., Giza, Egypt, during 2000 and 2001 seasons, to study the effect of nitrogen fertilizer levels on growth, yield and yield components of some maize (*Zea mays* L.) cultivars grown under two farming systems. The soil texture was clay loam and its chemical analysis is shown in Table (A).

Table (A): Mechanical and Chemical analysis of soil at experimental site at Giza in 2000 and 2001 seasons

Season	Mechanical analysis			Chemical analysis			
	Clay %	Silt %	Sand %	Organic matter %	N ppm	P ppm	PH
2000	37.6	24.4	38.0	1.8	43	17	7.4
2001	37.9	23.7	38.4	1.6	46	15	7.6

Each experiment included 18 treatments which were the combinations of two tillage systems, three nitrogen levels and three maize cultivars. The treatments were as follows:

I – Tillage systems:

1- Conventional tillage (CT),i.e. normal corn management practices.
2- No- tillage (N T), i.e. no ploughing.

II- Three nitrogen fertilizer levels:

Three N levels (80, 110 and 140 kg N/ fad) were applied in two equal split applications before the first and second irrigation in form of ammonium nitrate (33.5% N).

III – Maize cultivars:

1- Single cross 10 (SC 10)
2- Three way cross 310 (TWC 310)
3- Composite cultivar (Giza 2)

The preceding crop was faba bean in both seasons. Planting date was May 15 in both seasons. All other recommended cultural practices, except those under study, for the regions were practiced in both seasons.

The experimental design was split- split plot design with three replications. The main plots were allocated to tillage systems. N – levels randomly distributed in the sub – plot and maize cultivars were arranged at in the sub- sub plots. Each sub sub-plot consisted of 6 ridges, each 5 m long and 70 cm width ($21m^2$).

Number of days from planting to emergence, to 50 % tasseling and to50% silking were recorded on the whole plot basis. At 90 days from planting, plant height, ear height, number of green leaves / plant and ear leaf area were determined on a random ten plants from each plot. At harvest, ten plants were taken at random from each plot to determine ear grain weight, 100- grain weight and grain yield / plant. Grain yield, biological yield and harvest index were determined from the whole plot plants. The grain yield per fad was adjusted to 15.5 % moisture content.

All collected data were statistically analyzed according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

C) Effect of tillage systems:

1- Growth characters :

Data in Table 1 showed insignificant effect for the tillage system on all growth characters, except number of days to emergence, in both seasons and plant height and ear height in second season.

Days to emergence, with no-tillage treatment were fewer than conventional tillage in both seasons. Values of plant height and ear height for no- tillage system were lower than those of conventional tillage. Also, most values of growth traits of no-tillage system were lower than that of conventional tillage system. The negative effects associated with no- tillage system may be due to the bad soil conditions, which may affect crop growth. These results agreed those obtained by Wilhelm *et al*. (1991) and Sherif *et al*. (1995) .

2- Yield and yield components :

Data of yield and yield components of maize are presented in Table 2. Tillage system induced significant effect on yield and its components, except 100–grain weight and biological yield /fad. in both seasons. No – tillage treatment gave lower yield components as well as lower grain yield compared with conventional tillage. This means that normal tillage would generally provide better soil conditions for the plant growth. These negative effects of no- tillage system are revealed by a reduction in plant height, number of effective leaves / plant, ear leaf area, ear grain weight and grain yield / plant which may caused the reduction in maize grain yield per faddan. Sherif *et al*. (1995) reported that no – tillage may be unsuitable for heavy texture soil due to restricted root development, which would lead to

meagerness of growth characters and yield components of maize. These results agreed those obtained by Hughes *et al*. (1992), Pierce *et al*. (1992) and Smart and Bradford (1999).

B) Effect of nitrogen fertilizers:

1- Growth characters :

Table 1 shows that N levels had significant effect on all studied traits, except days to emergence in both seasons and ear height in the first season.

In both seasons, highest values of growth characters under study were obtained with application the highest nitrogen fertilizer rate (140 kg N/ fad). Similar results were obtained by EL- Gezawy (1996); EL- Habbak (1996) and EL- Habbak and Shams EL- Din (1996)).

Increasing N level from 80 to 110 or 140 kg / fad significantly delayed tasseling and silking dates where the highest dose of nitrogen (140 kg N/ fad) gave the longest vegetative growth period. Similar results were reported by Gouda *et al.* (1992). On the contrary, EL- Habbak (1996) reported that increasing N level from 90, 110 or 130 kg N / fad significantly reduced tasseling and silking dates, the highest dose of nitrogen (130 kg N / fad) reduced number of days to tasseling and silking.

2- Yield and yield components:

Results shown in Table 2 showed that all characters of yield and its components were significantly affected by nitrogen fertilizer levels in both seasons. The highest values of ear grain weight, 100– grain weight, grain yield / plant, grain yield / fad., biological yield/ fad(2000 season) and harvest index (2001 season) were obtained with application of 140 kg N/ fad.

Increasing N levels from 110 to 140 kg N / fad. caused insignificant increase in grain yield / fad. and harvest index in the both seasons and biological yield / fad in second season. The minimum values for these characers were obtained from the application of 80 kg N / fad. Application of 140 Kg N/ fad increased grain yield / fad., over the 80 and 110 kg N/ fad. by 42.76 and 10.81% in the first season and by 39.60 and 9.61% in the second season, respectively. The increase in grain yield/ faddan was due to the increase in ear grain weight, 100 – grain weight and grain yield / plant. These results are in agreement with those obtained by Gouda *et al*. (1992); EL-Sheikh, (1993); Moshtohry *et al*. (1995); EL-Habbak, (1996); EL- Habbak and Shams EL- Din (1996) and Gordon *et al*. (1997).

C) – Effect of cultivars:

1-Growth characters:

Data presented in Table 1 revealed that the differences among cultivars in number of days to 50 % silking, plant height, number of green leaves/ plant and ear leaf area were significant in both seasons, whereas number of days to 50 % tasseling and ear height differed significantly only in 2001 season. While the differences in number of days to emergence owing to cultivars were insignificant in both seasons.

The two hybrids (SC 10 and TWC 310) surpassed the open pollination cultivar Giza 2 for plant height, ear height, number of leaves / plant and ear leaf area in both seasons. The three way cross 310 gave the highest values of plant height and ear height in both seasons. While, single cross 10

cultivar gave the highest values of number of leaves /plant and ear leaf area as well as, 50 % silking in both seasons. Regarding date of tasseling and silking, Giza 2 cultivar was earlier than the other studied genotypes. These results are mainly due to the differences in the genetically make up of maize cultivars. These results are in accordance with those obtained by Gouda *et al*. (1992) and EL- Gezawy (1996) and EL- Habbak (1996) who reported that Giza 2 cultivar was earlier than the hybrids for of tasseling and silking.

2- Yield and yield components :

Data in Table 2 indicate that cultivars differed significantly in all studied characters in both seasons of study, except 100 – grain weight and biological yield which were significantly different in second season only. Results also show that SC 10 hybrid recorded highest values for all traits in both seasons followed by TWC 310.

Single Cross 10 produced exceeded TWC 310 and Giza 2 cultivars in grain yield/ fad by 5.51 and 15.49% in the first season and 5.61 and 14.51% in the second one, respectively. These results are in accordance with those obtained by EL- Gezawy (1996), EL- Habbak and Shams EL- Din (1996) and Reddy and Khera (1999).

d) The interaction effects:

Table 3 shows the significance of interaction effects on all studied characters in both seasons. The significant interactions will be discussed as follow:

1-Tillage systems (A) x nitrogen levels (B) interaction effect:

The interaction between tillage systems and nitrogen levels had significant effect on harvest index in both seasons (Table 4). The highest value of harvest index was obtained via conventional tillage and application of 110 kg N/ fad in the first season. While in the second season the highest value was obtained with no- tillage and application of 140 kg N/ fad. (Table 4).

2- Tillage systems (A) x cultivars (B) interaction effect:

This interaction had significant effect on ear grain weight and grain yield/fad in both seasons. The highest values for both traits were obtained when SC 10 was grown with conventional tillage in both seasons (Table 5).

3- Nitrogen levels x cultivars interaction effect:

The interaction effect between nitrogen levels and cultivars were significant on number of days to 50 % silking, plant height, ear height, ear leaf area, ear grain weight, grain yield / plant and grain yield/ fad in both seasons (Tables 6 and 7). The lowest number of days to 50% silking in both seasons were obtained from TWC 310 with 80 kg N / fad. The highest value of plant height and ear height were obtained by application of 140 kg N/ fad to TWC 310 cultivar in both seasons. Also, the highest values of ear leaf area, ear grain weight, grain yield / plant and grain yield / fad were recorded by application of 140 kg N/ fad to SC 10 cultivar in both seasons. The lowest values of plant height, ear height, ear leaf area, ear grain weight, grain yield / plant and grain yield / fad. were obtained by fertilization Giza 2 cultivar with 80 kg N / fad. in both seasons. Such results are in accordance with those

obtained by Gouda *et al.* (1992); Shafshak *et al* (1994); EL- Gezawy, (1996); EL- Habbak and Shams EL- Din (1996) and Reddy and Khera (1999).

On the other side, B x C interaction effect was significant, in one season only, on 100 – grain weight and biological yield / fad (Table 1).

Table (4): Mean of harvest index as influenced by the interaction between with tillage systems and nitrogen levels in 2000 and 2001 seasons.

Nitrogen levels (B)	Tillage systems (A)			
	2000 season		2001 season	
	C. T.	N. T.	C. T.	N. T.
80 kg N/ fad.	36.60	33.43	34.86	33.07
110 kg N/ fad.	39.15	37.13	38.55	37.36
140 kg N/fad.	37.31	37.80	39.26	39.36
LSD at 0.05	2.31		2.49	

Table (5): Mean of ear grain weight and grain yield/ plant as influenced by the interaction between tillage systems and cultivars in 2000 and 2001seasons.

Cultivars (C)	Tillage systems (A)			
	C. T.	N. T.	C. T.	N. T.
	Ear grain weight (g)		Grain yield/ plant (g)	
2000 season				
S. C. 10	187.88	178.17	203.44	193.31
T. W. C. 310	167.11	162.60	180.51	173.67
Giza 2	152.73	148.87	170.82	161.18
LSD at 0.05	3.49		4.54	
2001 season				
S. C. 10	193.99	184.22	213.46	201.95
T. W. C. 310	168.29	160.20	187.12	178.20
Giza 2	162.17	155.00	177.10	166.64
LSD at 0.05	8.11		7.42	

Table (6): Mean of some characters growth as influenced by the interaction between nitrogen levels and cultivars (C) in 2000 and 2001 seasons.

Cultivars (C)	Nitrogen levels kg/ fad (B)											
	80	110	140	80	110	140	80	110	140	80	110	140
	Days to 50% silking			Plant height (cm)			Ear height (cm)			Ear leaf area (cm^2)		
2000 season												
S. C. 10	62.0	67.6	69.7	251	283	302	130.8	131.7	142.7	735.7	754.5	772.2
T. W. C. 310	61.1	67.0	70.0	275	300	331	130.8	139.5	143.1	730.9	741.6	764.3
Giza 2	61.1	64.5	69.6	223	257	281	120.5	134.3	143.0	717.2	731.4	756.2
LSD at 0.05	1.5			11.0			17.4			4.2		
2001season												
S. C. 10	61.1	66.7	69.0	270	281	292	131.7	134.3	141.5	738.1	756.5	777.5
T. W. C. 310	59.3	66.0	70.2	286	302	319	139.0	146.0	157.5	733.3	746.9	772.0
Giza 2	60.1	64.0	68.7	230	254	272	110.5	121.2	130.0	721.6	737.6	762.9
LSD at 0.05	1.4			8.0			4.4			3.4		

Table (7): Mean of ear grain weight, grain yield/ plant and grain yield/ fad. as influenced by the interaction between nitrogen levels and cultivars in 2000 and 2001 seasons.

Cultivars (C)	Nitrogen levels(kg/fad) (B)								
	80	110	140	80	110	140	80	110	140
	Ear grain weight (g)			Grain yield/ plant(g)			Grain yield/ fad.(ard)		
2000 season									
S. C. 10	139.6	177.9	231.5	148.8	199.5	246.9	17.6	22.7	24.5
T. W. C. 310	112.5	162.7	219.4	125.7	175.1	230.5	16.3	21.5	23.6
Giza 2	99.7	141.6	211.1	105.9	163.3	228.8	15.2	19.00	21.9
LSD at 0.05	4.2			2.6			1.1		
2001 season									
S. C. 10	164.7	183.8	218.9	177.6	199.5	246.1	17.9	23.1	25.0
T. W. C. 310	131.2	159.3	202.3	148.9	175.1	223.9	16.7	22.0	23.8
Giza 2	135.8	148.6	191.3	148.6	162.8	204.2	16.1	19.5	22.0
LSD at 0.05	9.9			9.1			1.2		

4- Tillage systems x nitrogen levels x cultivars interaction effect:

Data in Tables 8, 9 and 10 revealed that the second order interaction between the studied factors had significant effect on days to 50% silking, ear leaf area, ear grain weight, grain yield per plant and per faddan in both seasons. Results indicated that TWC 310 cultivar was the earliest one when planted under no- tillage system and 80 kg N/ faddan in both seasons (Table 8). However SC10 produced greatest ear leaf area under the condition of conventional tillage system and 140 kg N/ faddan (Table 8). Such treatment combination also showed greatest ear grain weight in both seasons and greatest grain yield/ plant in the second season (Table 9). Therefore, such treatment combination (CT x SC 10 x 140 kg N) produced the highest grain yield/ faddan in both seasons (Table 10). However, results in Table 10 indicated that the differences in grain yield of CT x 140 kg N x SC 10, NT x 140 kg N x SC 10 and CT x 110 kg N x SC 10 treatments did not reach to the significance level. Therefore, it could be concluded that SC10 is the best studied cultivar and could be produce greatest grain yield under the CT with 110 kg N/ faddan or under the condition of NT system with 140 kg N/ faddan. Preference one of these two treatments will depends on the economics of tillage practices compared to the price of the additional 30 kg N when the NT used.

Table (8): Mean of number of days to 50% silking and ear leaf area as influenced by the interaction between tillage systems, nitrogen levels and cultivars in 2000 and 2001 seasons.

Tillage systems (A)	C. T.			N. T.			C. T.			N. T.		
Nitrogen levels kg/fad (B)	80	110	140	80	110	140	80	110	140	80	110	140
	Days to 50% silking						Ear leaf area (cm^2)					

2000 season													
Cultivars (C)	S.C. 10	64.0	68.0	70.0	60.0	67.3	69.3	745.6	772.5	786.7	725.8	736.5	757.9
	T.W.C. 310	63.0	67.3	71.0	59.3	66.7	69.0	742.4	753.3	777.9	719.5	729.6	750.7
	Giza 2	61.3	65.0	69.7	61.0	64.0	69.6	730.7	743.3	769.3	703.8	719.5	743.3
LSD at 0.05		2.1						5.9					
2001 season													
Cultivars (C)	S.C. 10	62.7	67.2	69.0	59.7	66.3	69.0	750.8	771.8	794.8	725.5	741.1	760.1
	T.W.C. 310	60.3	66.0	71.7	58.3	66.0	68.7	746.6	760.6	786.7	719.9	733.1	757.1
	Giza 2	60.7	64.3	70.7	59.7	63.7	66.7	736.2	749.2	777.8	706.9	725.9	747.8
LSD at 0.05		2.0						4.8					

Table (9): Mean of ear grain weight and grain yield/ plant as influenced by the interaction between tillage systems, nitrogen levels and cultivars in 2000 and 2001 seasons.

Tillage system (A)		C. T.			N. T.			C. T.			N. T.		
Nitrogen levels Kg/fad (B)		80	110	140	80	110	140	80	110	140	80	110	140
		Ear grain weight (g)						Grain yield / plant (g)					
2000 season													
Cultivars (c)	C. S. 10	148.9	181.3	233.3	130.3	174.5	229.7	157.0	207.9	245.3	140.6	190.9	248.4
	T. W. C. 310	117.7	170.6	213.1	107.3	154.8	225.7	132.2	183.7	225.7	119.3	166.5	235.2
	Giza 2	104.1	147.7	206.4	95.3	135.5	215.8	108.9	174.7	228.8	102.8	151.9	228.9
LSD at 0.05		6.0						7.9					
2001 season													
Cultivars (c)	C. S. 10	168.2	189.4	224.4	161.2	178.1	213.4	181.3	204.5	254.6	173.8	194.5	237.5
	T. W. C. 310	134.4	163.6	206.9	127.9	155.0	197.6	152.4	179.6	229.3	145.6	170.5	218.5
	Giza 2	138.7	152.5	195.3	132.9	144.7	187.4	151.5	168.8	210.9	145.7	156.8	197.5
LSD at 0.05		14.1						12.8					

Table (10): Mean of grain yield / fad (ardab) as influenced by the interaction between tillage systems, nitrogen levels and cultivars in 2000 and 2001 seasons.

Tillage systems (A)		C. T.			N. T.		
Nitrogen levels kg /fad. (B)		80	110	140	80	110	140
2000 season							
Cultivars (C)	S.C. 10	18.5	24.0	24.7	16.8	21.5	24.3
	T.W.C.310	17.0	22.4	23.8	15.6	20.6	23.5
	Giza 2	16.1	19.5	22.4	14.2	18.5	21.6
LSD at 0.05		1.9					
2001 season							

Cultivars (C)	SC 10	18.9	24.1	25.1	17.0	22.1	24.9
	T.W.C.310	17.4	22.9	24.0	16.0	21.2	23.7
	Giza 2	17.0	20.1	22.2	15.2	19.0	21.9
LSD at 0.05		1.4					

REFERENCES

Burgos, N.R.; R.Carillo; R. Ortuoste and R. Reintar (1989). Growth and yield performance of corn cultivars as affected by fertilizer levels. USMARC – Monitor 10 (3) 6 – 7 .

EL- Habbak, K. E. (1996). Response of some maize cultivars to plant density and nitrogen fertilization. Ann. Agric. Sci., Moshtohor, Egypt, 34 (3): 951 – 970.

EL- Habbak, K. E. and G. M. Shams EL- Din (1996). Response of some maize genotypes to nitrogen fertilizer levels. Ann. Agric. Sci., Moshtohor, Egypt, 27 (2): 783 – 795.

EL- Gezawy, N. Kh. B. (1996). The effect of nitrogen fertilizer and agrispon on the yield of some maize cultivars (*Zea mays* L.) M. Sc. Thesis, Fac . Agric., Moshtohor , Zagazig Univ., Egypt.

EL- Sheikh, F.T.Z.M. (1993). Response of maize (*Zea mays* L) to nitrogen fertilizer and foliar application with zinc. Ann. Agric. Sci., Moshtohor, Egypt, 31 (4): 1999 – 2009.

Gordon, W. B.; D. L. Fjell and D. A. Whitney (1997). Corn hybrid response to starter fertilizer in a no – tillage , dryland environment. J. of Production Agric., 10 (3) 401 – 404.

Gouda, A. S. A.; M.M. Abdallah and R. I. Faisal (1992). Response of some maize cultivars to nitrogen fertilization. Ann. Agric. Sci., Moshtohor, Egypt, 30 (4): 1649 – 1660.

Hammam, G.Y.(1995). Effect of nitrification inhibitor (Nitropyrin) and nitrogen level on growth and yield of maize . Ann. Agric. Sci, Moshtohor, Egypt, 33 (2): 495 – 506.

Hassan, A.A. (1995). Agronomic characteristics of eight maize cultivars as affected by nitrogen fertilization. 1– Plant characteristics. Zagazig J. Agric . Res., 22 (2): 377 – 385.

Hughes, K.A.; D. J. Horne; C.W. Ross and J.F. Julian (1992). A 10 – year maize/ oats rotation under three tillage systems,2- plant Population root distribution and forage yields. Soil and Tillage Res., 22 (1- 2): 145 – 157. Plant Physiology Division, DSIR, Palmerston North, New Zealand.(C.F. Field Crop Abst., 46 (2): 764).

Kitur, B.K.; K.R Qloons; S.A. Ebelhar and D.G. Bullock (1994). Tillage effects on growth and yield of corn on Grantsburg Soil. J. Soil and Water Conser. 49 (3): 266 – 273. (C. F. Field Crop Abst. 47 (12): 7720).

Matta, S.E.G.; E.A.E. Khodr; G.M.A. Mahgoub and M.A. K. Shalaby (1990). Effect of plant population density and nitrogen fertilization on growth and yield of some late maturing maize cultivars. Egypt, J. Appl. Sci., 5 (8): 519- 531.

Moshtohory, M. R.; M.A.Barboma; M.W.Habib and Z.R. Yehia (1995). The influence of intercom weed control method and N fertilization levels on maize (*Zea mays* L.) Ann of Agric. Sci., Moshtohor, Egypt, 33 (2): 579 - 587.

Norwood, C. A. (1999). Water use and yield of dry land row crops as a affected by tillage . Agron. J. 91 (1): 108 – 115.

Norwood, C. A and R. S. Currie (1998). An agronomic and economic comparison of the wheat– corn– fallow and wheat– sorghum– fallow rotations . J. of production Agric., 11 (1): 67 – 73.

Pierce, F. J.; M.C.A. Fortin and M.J. Staton (1992). Immediate and residual effects of zero– tillage in rotation with no-tillage on soil physical properties and corn performance. Soil and Tillage Res. 24 (2): 149–165. (C.F. Field Crop Abst. 46. (2): 762).

Reddy, D. D. and M. S. Khera (1999). Fertilizer, plant density and cultivar interactions and soil nutrient status under maximum yield research on maize – Sunflower system . International J. of Tropical Agric., 17 (1-4): 61 – 68.

Shafshak, S. E.; G. Y.Hammam; M. Amer Samiz and A. E. Fatma Nofal (1994). Differential growth and yield response of some maize genotypes to nitrogen fertilization . Ann . of Agric. Sci., Moshtohor , Egypt, 32 (3): 1265 – 1278.

Sherif, M.N.; S. K. Badr and A. M. Aly (1995). Effect of some preceding winter crops and tillage on growth, yield and yield components of maize. Egypt J. Appl. Sci., 10 (12): 127 – 138.

Smart, J. R. and J. M. Bradford (1999). Conservation tillage corn production for a semiarid, Subtropical environment . Agron. J., 91 (1): 116 – 121.

Steel, R. G. D. and J. H. Torrie (1980). Principles and procedures of statistics. 2nd Edit. Mc Grow – Hill Book Company.

Wilhelm, W.W.; M.R. Hinze and C.O. Gardner (1991). Maize hybrid response to tillage under irrigated and dryland conditions. Field Crop Res. 26 (1): 57 – 66.

إستجابة بعض أصناف الذرة الشامية للتسميد الآزوتي تحت نظامين للزراعة

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أقيمت تجربتان حقليتان بمحطة التجارب والبحوث الزراعية بكلية الزراعة – جامعة القاهرة بالجيزة لدراسة تأثير مستويات التسميد الآزوتي (٨٠ ، ١١٠ ، ١٤٠ كجم ن / الفدان) علي النمو والمحصول ومكوناته لبعض أصناف الذرة (هجين فردي ١٠ ، هجين ثلاثي ٣١٠، الصنف المفتوح التلقيح جيزة ٢) تحت نظامين للزراعة (الخدمة التقليدية ، عدم الخدمة).وتوضح النتائج :

2- إن نظام عدم الخدمة أعطي أقل القيم بالنسبة لكل من عدد الأيام حتى الإنبات ، طول النبات وارتفاع الكوز والمحصول ومكوناته بالمقارنة بنظام الخدمة التقليدية .

٢- زيادة مستوي التسميد الآزوتي من ٨٠ إلي ١١٠ أو ١٤٠ كجم ن / الفدان آخر تاريخ ظهور النورة المذكرة والمؤنثة معنويا حيث طالت فترة النمو الخضري مع الجرعة العالية من التسميد الآزوتي ١٤٠ كجم ن / الفدان . أدى إضافة ١٤٠ كجم ن / الفدان إلي زيادة محصول الحبوب

بمقدار ٤٢,٩٥ ، ١٠,٨١ % في الموسم الأول ، ٣٩,٦٠ ، ٩,٦١ % في الموسم الثاني مقارنة بإضافة ٨٠ أو ١١٠ كجم ن / الفدان علي الترتيب.

٣- تفوقت الهجن (الفردية ، الثلاثية تحت الدراسة) علي الصنف مفتوح التلقيح (جيزة ٢) في كلا من ارتفاع النبات والكوز وعدد الأوراق علي النبات ومساحة ورقه الكوز بينما كان الصنف جيزة ٢ أكثر تبكيراً للنورة المذكرة والمؤثنة مقارنه بالهجن تحت الدراسة .أنتج الهجين فردي ١٠ محصول حبوب أكثر من الهجين الثلاثي ٣١٠ ، الصنف جيزة ٢ بمقدار ٥,٥١ ، ١٥,٤٩ % في الموسم الأول، ٥,٦١ ، ١٤,٥١% في الموسم الثاني علي الترتيب .

٤- الهجين الثلاثي ٣١٠ كان أكثر تبكيرا عندما زرعت النباتات بنظام عدم الخدمة مع أضافه ٨٠ كجم ن / الفدان . وأعطي الهجين الفردي ١٠ أكبر مساحة لورقة الكوز عندما زرع تحت نظام الخدمة التقليدية مع إضافة ١٤٠ كجم ن / الفدان . أعطي الهجين فردي ١٠ عندما زرع تحت نظام الخدمة التقليدية مع أضافه ١١٠ أو ١٤٠ كجم ن / الفدان أعلي محصول حبوب / الفدان وبينما أعطي تحت نظام عدم الخدمة أعلى محصول مع ١٤٠ كجم ن/ الفدان دون فروق معنوية.

Table (1): Some growth characters of corn as influenced by tillage systems, nitrogen levels and cultivars in 2000 and 2001 seasons.

Factors		Days to emerg.		Days to 50% tasseling		Days to 50% silking		Plant height (cm)		Ear height (cm)		No. of green leaves/plant		Ear leaf area (cm^2)	
		2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Tillage systems (A)	CT	5.25	5.63	60.57	59.32	66.59	65.83	275.74	283.93	133.52	137.57	11.93	12.41	757.95	763.88
	No- tillage	3.25	4.04	59.14	58.04	65.15	64.22	280.96	273.81	136.82	131.69	10.33	11.19	731.83	735.31
LSD at 0.05 %		1.27	1.10	NS	NS	NS	NS	NS	3.81	NS	2.45	NS	NS	NS	NS
Nitrogen levels kg / fad. (B)	80	4.06	4.78	55.44	54.70	61.44	60.22	249.94	262.44	127.39	127.06	9.33	9.84	727.95	731.00
	110	4.50	4.94	60.11	58.34	66.39	65.58	280.11	279.50	135.17	133.83	10.94	11.73	742.48	747.01
	140	4.22	4.78	64.00	63.00	69.78	69.28	305.00	294.67	142.95	143.00	13.11	13.83	764.24	770.77
LSD at 0.05 %		NS	NS	1.36	2.31	1.16	2.16	5.28	7.56	NS	5.45	0.96	1.63	7.00	7.51
Cultivars (C)	S.C. 10	4.28	4.78	60.39	59.56	66.44	65.64	278.89	281.61	135.06	135.83	11.83	12.62	754.14	757.38
	T.W.C. 310	4.22	4.83	59.83	58.95	66.06	65.17	302.22	302.61	137.83	147.50	11.67	12.17	745.58	750.71
	Giza 2	4.28	4.89	59.33	57.53	65.10	64.28	253.94	252.39	132.61	120.56	9.89	10.61	734.96	740.70
LSD at 0.05 %		NS	NS	NS	0.90	0.86	0.81	6.12	4.65	NS	2.52	0.44	0.50	2.42	1.96

Table (2): Yield and yield components of corn as influenced by tillage systems, nitrogen levels and cultivars in 2000 and 2001 seasons.

Factors		Ear grain weight (g)		100- grain weight (g)		Grain yield / plant (g)		Grain yield/ fad. (ardab)		Biological yield / fad. (tons)		Harvest index (%)	
		2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Tillage systems (A)	CT	169.24	174.82	34.16	33.73	184.92	192.56	20.93	21.29	7.76	7.90	37.69	37.56
	NT	163.21	166.47	32.93	32.53	176.05	182.26	19.62	20.10	7.53	7.64	36.12	36.60
LSD at 0.05 %		2.47	1.02	NS	NS	7.44	4.27	0.88	0.84	Ns	NS	0.95	0.81
Nitrogen levels kg N / fad. (B)	80	117.27	143.88	31.48	30.13	126.78	158.38	16.37	16.92	6.54	6.97	35.01	37.96
	110	160.74	163.89	31.99	32.56	179.30	179.12	21.09	21.55	7.73	7.94	38.14	39.31
	140	220.67	204.16	37.16	36.70	235.38	224.74	23.37	23.62	8.68	8.41	37.55	39.4
LSD at 0.05 %		11.22	5.15	2.06	2.88	12.52	5.17	2.15	2.33	0.83	0.78	2.80	3.14

Cultivars (C)	S.C. 10	183.03	189.10	34.41	34.96	198.37	207.71	21.62	22.02	7.98	7.98	37.88	38.48
	T.W.C. 310	164.86	164.25	32.98	32.65	177.09	182.66	20.49	20.85	7.61	7.89	37.50	36.78
	Giza 2	150.80	158.59	33.24	31.77	166.00	171.87	18.72	19.23	7.37	7.45	35.33	35.99
LSD at 0.05 %		2.46	5.73	NS	0.52	3.21	5.24	1.23	1.35	NS	0.40	1.68	1.23

Table (3): Significance of growth and yield characteristics of maize as influenced by tillage systems (A) x nitrogen levels (B) x cultivars (C) interactions in 2000 and 2001 seasons.

Interactions	Growth characters													
	Days to emerg.		Days to 50% tasseling		Days to 50% silking		Plant height (cm)		Ear height (cm)		No. of green leaves/plant		Ear leaf area (cm^2)	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
A x B	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
A x C	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	*	*	*	*	*	*	NS	NS	*	*
A x B x C	NS	NS	NS	NS	*	*	NS	NS	NS	NS	NS	NS	*	*

Interactions	Yield and yield components											
	Ear grain weight (g)		100- grain weight (g)		Grain yield / plant (g)		Grain yield/ fad. (ardab)		Biological yield / fad. (tons)		Harvest index (%)	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
A x B	NS	NS	NS	NS	NS	NS	Ns	Ns	NS	Ns	*	*
A x C	*	*	NS	NS	NS	NS	*	*	*	NS	NS	NS
B x C	*	*	NS	*	*	*	*	*	*	NS	NS	NS
A x B x C	*	*	NS	NS	*	*	*	*	NS	NS	NS	NS

*** and NS indicate significant and non- significant at 0.05 level of probability, respectively.**

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