J. Agric. Sci. Mansoura Univ., 34 (2): 1253 - 1264, 2009

EFFECT OF PLANT POPULATION, ORGANIC FERTILIZATION AND NITROGEN LEVELS ON GROWTH AND YIELD OF MAIZE

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ABSTRACT

Two field experiments were performed at the Experimental Station, Faculty of Agriculture, Mansoura University, during the two successive summer seasons of 2006 and 2007. The main objectives of this study were to determine the effect of organic fertilization (compost) doses, plant population (hill spacing) and nitrogen fertilizer levels on growth, yield and its components of maize (*Zea mays* L.) Single Cross Hybrid Pioneer 30 K 9 (S.C.H.P. 30 K 9). A strip split plot design with four replicates was used. The obvious results of this investigation can be summarized as follows:

- All studied characters were significantly improved by applying organic fertilization (compost) doses in both seasons.highest values of maize growth and productivity parameters were obtained by the application of organic fertilization(compost)at 4t/fed in both seasons.
- Increasing plant spacings up to 30 cm between hills (20 000 plant/fed) increased all studied characters, except number of days from sowing to 50 % tasseling and plant height, which increased due to sowing maize in hills 20 cm apart (30 000 plants/fed) in both seasons. Sowing maize plants in hills 25 cm apart (medium space *i.e.* 24 000 plants/fed) surpassed other plant spacings in grain yield (ardab/fed) in both seasons.
- Application nitrogen fertilization at the level of 125 kg N/fed significantly exceeded other studied levels (50, 75 and 100 kg N/fed) with respect to their effect on all the studied growth parameters and yield components as well as grain yield of maize in both seasons.

Generally, it can be concluded that according to the obtained results from this study, sowing maize Single Cross Hybrid Pioneer 30 K 9 plants at 25 cm space between hills (24 000 plant/fed) and adding 4 t/fed compost as well as 100 or 125 kg N/fed can be consider the best treatment for raising maize productivity under the environmental conditions of El-Mansoura region.

INTRODUCTION

Maize (*Zea mays* L.) is the most widely grown crop in many countries in the world. Maize is a major source of starch and in many industrialized food products. It is also a major source of cooking oil (corn oil). Maize is also widely grown to feed livestock, as forage, silage or grain. In Egypt, maize is considered as one of the main cereal crops, comes the third after wheat and rice. Maize is very essential either for the human food or animal feeding and a common ingredient for industrial products. Consequently, a great attention should be paid to increase maize productivity by maximizing yield per unit area in order to reduce the gab between its production and consumption. Since, maize is well known for its high demand for nutrients and other production inputs. Thereby, among factors that may be improveme maize productivity organic fertilization (compost) doses, plant population (hill spacing) and nitrogen fertilizer levels.

The use of organic fertilization as compost in agriculture are practiced in Egypt recently. The role of organic fertilization (compost) is improving soil organic matter, nitrogen content, P_2O_5 concentration and exchangeable cations. Furthermore decreasing soil pH, which result in increasing solubility of nutrients and nutrient availability to the plants hence enhancement plant growth and development as well as gradually increasing grain yields of maize (Salem, 1988 and Ali *et al.*, 2003). Toderi *et al.* (1999) showed that the use of organic materials (maize and wheat straw) improved soil organic matter, nitrogen content, P_2O_5 concentration, exchangeable cations and apart of Fe consequently enhancement plant growth and development as well as yield. Fatma, Nofal *et al.* (2005) noticed that applying 10 m^3/fed of chicken manure or rice straw compost increased maize grain yield as compared with the control treatment (without organic manure). This increment may be attributed to that organic manure contains of microorganisms which fix and release phytohormones, which stimulate plant growth. Sheng, Mao *et al.* (2006) showed that farmyard manure supplies adequate amounts of nutrients such as N and K which tended to balance crop requirements and resulted in improving grain yield of maize. El-Hamdi *et al.* (2008) revealed that the highest values of ear diameter, 100 – grain weight and grain yield were obtained from fertilization with 10 m3 of chicken manure/fed.

As maize do not have tillering capacity to adjust to variation in plant stand, optimum plant population for grain production are important. Thus, to increase grain yield, it must be planted maize at proper plant population. Samira *et al.* (2000) concluded that the highest values of 100-kernel weight, and grain yield (ardab/fed) were obtained at hill space of 25 cm expressed 24000 plants/fed. El-Far (2001) found that number of days from sowing to 50 % tasseling and silking, plant height and ear height were significantly increased with increasing the density to 30 000 plants/fed (20 cm apart) in both seasons. Vice-versa, stem diameter, ear leaf area, ear length, ear diameter, number of grains/row, 100-grain weight and grain yield/plant were significantly increased by increasing plant density to 20 000 plants/fed (30 cm apart) in both seasons. Sharief (2001) showed that increasing plant population density of maize to 20 – 30 thosund plants/fed, or sowing maize in narrow row sapcing 51 – 60 cm and hill spacing of 25 – 30 cm apart gave optimum plant density for maximizing grain yield per unit area depending on density pattern, sowing date, soil fertility and cultivars.

Maize requires high nitrogen amounts to warrant high yields. Where nitrogen plays a key role in plant nutrition. It is the mineral element that required in the greatest quantity by cereal crop plants especially maize and it is the nutrient most often deficit in the Egyptian soils. Thus, increasing application of nitrogen fertilizer levels led to significant increases in growth, yield and its components of maize crop (Cox and Cherney, 2001 ; El-Far, 2001 ; El-Murshedy, 2002 ; El-Mahdy, Amal, 2003 ; Toaima and Saleh, 2003; Abd-Alla, 2005 ; Samira, Hussein, 2005 ; Atia and Mahmoud, 2006 ; Seadh and El-Zehery, 2007 ; Abdel-Hafez *et al.*, 2008 and El-Hamdi *et al.*, 2008). In spit of mineral fertilizers have a good effect on plant productivity, Schroder *et al.* (2000) stated that high nitrogen application rates are used by maize growers as an insurance, but may have an adverse effect on the environment. Therefore, it must be adjusted application of nitrogen rates to the amounts of soil mineral nitrogen present shortly before planting.

Thus, this study was aimed to determine the effect of organic fertilization (compost) doses, hill spacing and nitrogen fertilizer levels as well as their interactions on growth, yield and its components of maize Single Cross Pioneer 30 K 9 (S.C.P. 30 K 9) under the environmental conditions of Mansoura district.

MATERIALS AND METHODS

Two field experiments were performed at the Experimental Station, Faculty of Agriculture, Mansoura University, during 2006 and 2007 seasons to determine the effect of organic fertilization (compost) doses, hill spacing (plant population) and nitrogen fertilizer levels on growth, yield and its components of maize (*Zea mays* L.) Single Cross Hybrid Pioneer 30 K 9 (S.C.H.P. 30 K 9).

The experiments were laid-out in a strip split plot design with four replicates. The vertical plots were assigned to three organic fertilization (compost) doses *i.e.* 0, 2 and 4 t/fed compost. After soil preparation, ridging and determining experimental plots of organic fertilization (compost) doses, ridges were leveled and then aforementioned doses of compost were added, finally, ridging was performed again. Chemical analysis of used compost was shown in Table 2.

Table 1: Chemical analysis of used compost.

Analysis	Result	Analysis	Result
Color	Dark brown	Nitrate nitrogen (ppm)	27
Odor	Accepted	Organic matter (%)	36.56
Texture	Spongy	Organic carbon (%)	20.84
Seed weeds	Nil	Ash (%)	63.44
Nematodes	Nil	C : N ratio	16.8 : 1
Wet weight (kg/m^3)	640	Total phosphorus (%)	0.57
Dry weight (kg/m^3)	460	Total potassium (%)	1.15
Humidity (%)	27.8	Fe (%)	1.26
pH (1:10)	8.8	Mn (ppm)	578
Total nitrogen (%)	1.24	Cu (ppm)	136
Ammonium nitrogen (ppm)	330	Zn (ppm)	130

The Horizontal plots were devoted to three hill spacing (20, 25 and 30 cm between hills i.e. 30 000, 24 000 and 20 000 plants/fed, respectively).

While, the sub – plots were allocated to four nitrogen fertilizer levels (50, 75, 100 and 125 kg N/fed). Nitrogen fertilizer in the form of urea (46 % N) was added as a side-dressing at the previously mentioned levels in two equal parts, one half after thinning (before the first irrigation) and the other half before the second irrigation.

Each experimental basic unit (sub – plot) included five ridges, each of 70 cm width and 3.0 m length, resulted an area of 10.5 m^2 (1/400 fed). The preceding winter crop was onion (*Allium cepa* L.) in both seasons.

Soil samples were taken at random from the experimental field area at a depth of 0 – 30 cm from soil surface before soil preparation to measure the mechanical and chemical soil properties . Results of mechanical and chemical analysis are presented in Table 1.

Table 2: Mechanical and chemical soil characteristics at the experimental sites during the two growing seasons.

Soil analysis	2006	2007
Coarse sand (%)	1.52	1.65
Fine sand (%)	27.27	26.61
Silt (%)	28.16	32.44
Clay (%)	41.66	38.36
Texture class	clayey	clayey
Organic matter (%)	1.88	1.91
Available nitrogen (ppm)	25.62	26.40
Available phosphate (ppm)	14.68	15.74
Available potassium (ppm)	316.00	338.00
pH	7.68	7.87
EC m. mohs/cm at 25°C	2.33	2.76

The experimental field well prepared and then divided into the experimental units. Calcium superphosphate (15.5 % P_2O_5) was applied during soil preparation at the rate of 150 kg/fed. Maize grains were hand sown in hills at the rate of 2 – 3 grains/hill using dry sowing method (Afir) on one side of the ridge with the above mentioned hill spacing during the second week of May in 2006 and 2007 seasons. The other agricultural practices were kept the same as normally practiced in maize fields according to the recommendations of Ministry of Agriculture and Land Reclamation, except for the factors under study.

Data recorded:

A- Growth characters:

1- Number of days from planting to 50 % tasseling was determined of each sub – plot plants.

After 80 days from planting, random samples of ten guarded plants were taken at random from each sub – plot to determine the following growth characters:

2- Plant height (cm).

3- Ear height (cm).

4- Ear leaf area (cm^2) was calculated by the following formula according to Gardner *et al.* (1985):

5- Ear leaf area = maximum length X maximum width of ear leaf X 0.75

B- Yield and its components:

At harvest (after 120 days from planting) random samples of ten guarded plants were taken at random from each sub – plot to determine the following growth characters:

1- Ear length (cm).
2- Ear diameter (cm).
3- Number of grains/row.
4- Ear grains weight (g).
5- 100-grain weight (g).
6- Grain yield (ardab/fed); it was determined by the weight of grains per kilograms adjusted to 15.5 % moisture content of each plot, then converted to ardab per feddan.

All data were statistically analyzed according to the technique of analysis of variance (ANOVA) for the strip split – plot design as published by Gomez and Gomez (1984) by means of "MSTAT-C" Computer software package. The treatment means were compared using least significant difference (LSD) method at 5 % levels of probability according to the producer outlined by Waller and Duncan (1969).

RESULTS AND DISCUSSION

A- Effect of organic fertilization (compost) doses:

The obtained results obvious that number of days from sowing to 50 % tasseling, plant height (cm), ear height (cm) and ear leaf area (cm^2)were significantly affected by organic fertilization (compost) doses in both seasons (Table 3). The highest values of all these characters were obtained by application maize plants with the highest dose of compost (4 t/fed). While, the lowest values of above mentioned characters were resulted from control treatment (without organic fertilization) in the first and second seasons. The increase of growth characters due to organic matter may be ascribed to improve soil organic matter, nitrogen content, P_2O_5 concentration, exchangeable cations and apart of Fe and consequently enhancement of plant growth and development as well as yield. These results came in the similar point view with those reported by Toderi *et al.* (1999).

All yield components and yield *i.e.* ear length (cm), ear diameter (cm), number of grains/row, ear grains weight (g), 100-grain weight (g) and grain yield (ardab/fed) were significantly improved as a result of applying organic fertilization (compost) doses in both seasons (Table 4). The highest values of these characters were achieved by added 4 t/fed compost in both seasons. Superiority in grain yield and its components optained by adding 4 or 2 t/fed of organic matter and its components may be due to the improving action of organic matter on physical, biological and chemical properties of soil. Also, the use of organic matter improved soil c/n ration, nitrogen content, P_2O_5 concentration, exchangeable cations and apart of Fe and consequently enhancement plant growth and development as well as grain yield. The scope of this findings is generally in accordance to those obtained by Fatma, Nofal *et al.* (2005) and El-Hamdi *et al.* (2008).

Table 3: Number of days from sowing to 50 % tasseling, plant height (cm), ear height (cm) and ear leaf area (cm^2) as affected by organic fertilization (compost) doses, hill spacings and nitrogen fertilizer levels during 2006 and 2007 seasons.

Characters / Treatments	No. of days from sowing to 50 % tasseling		Plant height (cm)		Ear height (cm)		Ear leaf area (cm^2)	
	2006	2007	2006	2007	2006	2007	2006	2007
A- Organic fertilization (compost) doses:								
0 (t/fed) Control	57.6	58.6	260.3	291.7	128.4	147.7	681.8	692.9
2 (t/fed)	58.3	59.1	266.6	297.2	130.7	151.5	714.1	713.7
4 (t/fed)	58.9	59.8	287.6	303.7	133.2	154.5	718.4	805.8
F. test	*	*	*	*	*	*	*	*
LSD 5 %	0.16	0.20	1.1	0.6	0.5	0.5	9.4	6.1
B- Hill spacings (cm):								
20	58.6	59.6	279.6	300.9	128.0	148.6	696.3	725.3
25	58.2	59.2	271.2	297.7	131.0	151.5	705.3	737.7
30	57.8	59.8	263.8	293.9	133.2	153.7	712.7	749.4
F. test	*	*	*	*	*	*	*	*
LSD 5 %	0.13	0.07	1.9	1.3	0.4	0.7	6.5	2.5
C- Nitrogen fertilizer levels:								
50 kg N/fed	59.8	60.1	261.5	292.0	126.6	147.2	695.7	718.4
75 kg N/fed	58.4	59.5	268.1	295.4	129.6	149.8	698.7	734.7
100 kg N/fed	58.1	58.8	276.0	299.3	131.9	152.8	706.8	742.8
125 kg N/fed	57.6	58.3	280.6	303.4	134.9	155.1	717.8	754.0
F. test	*	*	*	*	*	*	*	*
LSD 5 %	0.14	0.15	3.3	1.1	0.6	0.7	5.5	4.1

B. Effect of hill spacings (plant population):

Number of days from sowing to 50 % tasseling and plant height (cm) were significantly increased with decreasing plant spacings (20 cm between hills) in both seasons (Table 3). While, ear height (cm) and ear leaf area (cm^2) were significantly increased by increasing hill spacings (30 cm between hills) in both seasons. These results could be attributed to a good utilization of light, nutrients and available water in case of 30 cm between hills which gave a shorted plants. More, in case of narrow plant spacings (20 cm) dense plants suffered from light competiton among maize plant. And this hastened stem internodes elongation and consequently length of plant was increased. These results are supported by these of El-Far (2001) and Sharief (2001).

Ear length (cm), ear diameter (cm), number of grains/row, ear grains weight (g) and 100-grain weight (g) were increased by increasing plant spacings (30 cm between hills), while, grain yield(ardab/fed) decreased in both seasons (Table 4). Increasing plant spacings from 20 to 25 cm markedly increased grain yield from 28.97 to 30.03 ardab/fed in the first season, and from 30.64 to 31.54 ardab/fed in the second season. While, increasing plant spacings from 25 to 30 cm between hills significantly decreased grain yield/fed up to 26.63 and 28.22 ardab/fed for the first and second seasons, respectively. Generally, 25 cm between hills (medium space) surpassed other plant spacings in grain yield (ardab/fed). It was followed by 20 cm between hills without any significant differences in aforementioned character in the first and second seasons. In spite of the increases in yield components and the reduction in barren stalk percentage by increasing hill spaces, grain yield/fed was decreased, because the increment percentage in yield components did not compensate the decline in number of productive plants, which was in range of recommendation for maize crop. Increasing hill space (30 cm) did not adequate to utilize the whole area of soil at the optimum density (30 cm) of maize plants, because this cultivar Single Cross Hybrid Pioneer 30 K 9 does not need a wide space (30 cm) due to the horizontal growth of their leaves. These results are in good agreement with those obtained by Samira *et al.* (2000) and Sharief (2001).

C. Effect of nitrogen fertilizer levels:

All growth characters under study were proved to be significant increase as a result of increasing nitrogen fertilizer level, except number of days from sowing to 50 % tasseling which decrease with increasing nitrogen fertilizer level in the first and second seasons (Table 3). Raising nitrogen fertilizer levels from 50 to 125 kg N /fed significantly improved all growth characters such as plant height (cm), ear height (cm) and ear leaf area (cm^2), while decreased number of days from sowing to 50 % tasseling in both seasons. Increasing nitrogen fertilizer level up to 125 kg N/fed resulted in highest means of all growth measurements as previously mentioned. Vice versa, maize plants growing with 50 kg N/fed (lowest nitrogen treatment) were induced the lowest ones in both seasons.

Table 4: Ear length and diameter (cm), number of grains/row, ear grains weight (g), 100-grain weight (g) and grain yield (ardab/fed) as affected by organic fertilization (compost) doses, hill spacings and nitrogen fertilizer levels during 2006 and 2007 seasons.

Characters / Treatments	Ear length (cm)		Ear diameter (cm)		Number of grains/row		Ear grains weight (g)		100-grain weight (g)		Grain yield (ardab/fed)	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
A- Organic fertilization (compost) doses:												
0 (t/fed) Control	18.61	19.56	3.91	4.09	40.44	43.29	188.8	200.8	37.42	37.10	22.39	23.54
2 (t/fed)	18.92	21.18	4.21	4.53	42.47	44.59	199.6	212.7	39.79	39.46	31.32	33.35
4 (t/fed)	19.50	22.86	4.59	5.10	43.23	45.73	207.6	223.3	43.74	43.49	31.92	33.52
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD 5 %	0.17	0.09	0.10	0.17	0.27	0.22	1.4	1.5	0.21	0.16	1.38	1.36
B- Hill spacings (cm):												
20	18.47	20.53	4.03	4.27	40.80	43.71	193.3	207.2	39.03	38.71	28.97	30.64
25	18.98	21.19	4.20	4.59	42.31	44.41	199.4	212.9	40.27	39.94	30.03	31.54
30	19.58	21.88	4.47	4.85	43.03	45.48	203.3	216.8	41.65	41.40	26.63	28.22
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD 5 %	0.10	0.13	0.11	0.11	0.26	0.17	1.9	1.6	0.22	0.32	1.77	2.01
C- Nitrogen fertilizer levels:												
50 kg N/fed	18.56	20.61	4.02	4.29	40.74	42.83	191.7	207.1	39.47	39.12	24.59	26.30
75 kg N/fed	18.82	21.05	4.19	4.49	41.80	44.40	197.4	210.8	40.00	39.71	26.87	28.38
100 kg N/fed	19.16	21.46	4.28	4.69	42.68	45.35	202.4	215.5	40.83	40.57	31.29	32.59
125 kg N/fed	19.51	21.69	4.45	4.81	42.97	45.55	203.3	215.8	40.97	40.65	31.42	33.27
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD 5 %	0.18	0.12	0.19	0.16	0.75	0.53	2.6	1.6	0.27	0.27	1.00	1.21

The increase in growth characters with the increase in nitrogen fertilizer levels may be due to the fact that nitrogen is a major nutrient element for meristimic activity which affected the increases in plant growth and development. These findings came of the same point view of El-Mahdy,Amal, (2003).

Raising nitrogen fertilizer levels from 50 to 125 kg N/fed showed a significant increase on all yield components (ear length (cm), ear diameter (cm), number of grains/row, ear grains weight (g), 100-grain weight (g) and grain yield (ardab/fed) as shown in Table 4. In both seasons, fertilizing maize plants with 125 kg N/fed gave the highest values of all yield components and grain yield. Moreover, 125 kg N/fed came in the first rank in grain yield (ardab/fed), while 100 kg N/fed treatment came in the second rank in the previously mentioned characters without significant differences between them in both seasons. This increase in grain yield and its components by increasing nitrogen fertilizer levels might be due to the improvement in plant growth and leaf chlorophyll content which reflected in turn increase in the different yield components. Similar observation was reported by Atia and Mahmoud (2006), Seadh and El-Zehery (2007) and El-Hamdi *et al.* (2008).

IV- Effect of interaction:

Regarding the effect of interactions, it could be noticed that grain yield (ardab/fed) was significantly influenced by the various ways of interaction during both seasons, except the interaction among the three factors in both seasons.

A significant interaction effect between organic fertilization (compost) doses X hill spacings on grain yield (ardab/fed) during the first and second seasons. It is great attention to expect that the highest grain yield (34.33 and 36.36 ardab/fed) were obtained by adding 4 t/fed compost and sowing maize plants at 25 cm distance between hills in the first and second seasons, respectively (Fig. 1). It was followed by 2 t/fed compost and sowing maize plants at 20cm distance between hills without significant differences in aforementioned character in both seasons.

Fig.2 indicated that the interaction between organic fertilization (compost) doses X nitrogen fertilizer levels had a significant effects on grain yield(ardab/fed.) weight in both seasons. Grain yield significantly increased with every increase in compost doses under all nitrogen levels. The highest values of grain yield (35.24 and 37.36 ardab/fed) were obtained with adding 4 t/fed compost and fertilized maize plants with 125 kg N/fed in the first and second seasons, respectively (Fig. 2). It was followed by using 4 t/fed compost and 100 kg N/fed without significant differences in aforementioned character in both seasons.

Grain yield (ardab/fed) was significantly affected by the interaction between hill spacings X nitrogen fertilizer levels in both seasons. Data graphically illustrated in Fig. 3 appear that the maximum values of grain yield were obtained from sowing maize plants at 25 cm between hills and adding 125 kg N/fed, which yielded 32.26 and 34.60 ardab/fed in the first and second seasons, respectively.

It can be concluded that sowing maize Single Cross Pioneer 30 K 9 plants at 25 cm space between hills (24 000 plant/fed) and adding 4 t/fed compost as well as 100 or 125 kg N/fed can be used as arecommended treatment to maximize maize productivity under the environmental conditions of El-Mansoura region.

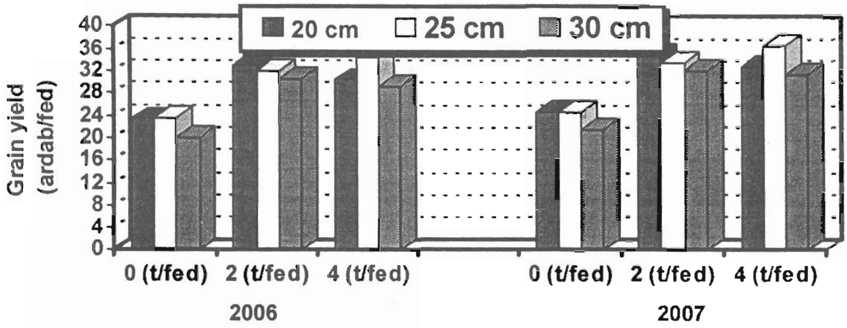

Fig. 1: Maize grain yield (ardab/fed) as affected by the interaction between organic fertilization (compost) doses and hill spacings during 2006 and 2007 seasons.

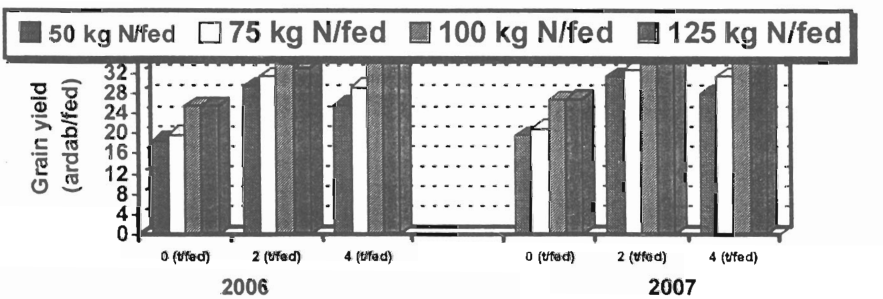

Fig. 2: Maize grain yield (ardab/fed) as affected by the interaction between organic fertilization (compost) doses and nitrogen fertilizer levels during 2006 and 2007 seasons.

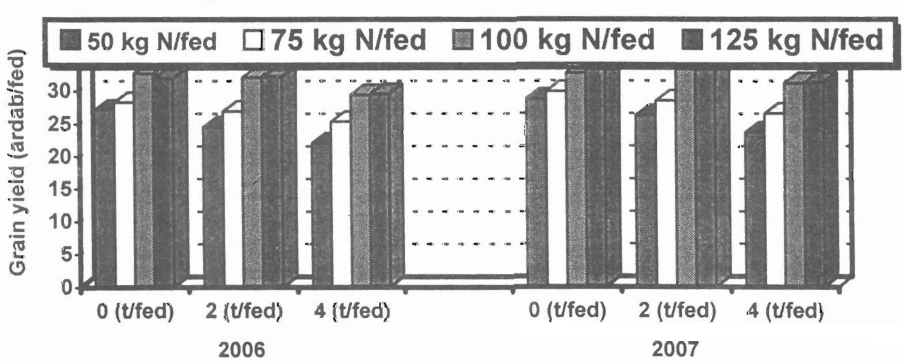

Fig. 3: Maize grain yield (ardab/fed) as affected by the interaction between hill spacings and nitrogen fertilizer levels during 2006 and 2007 seasons.

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تأثير الكثافة النباتية والتسميد العضوى ومستويات النيتروجين على نمو ومحصول الذرة الشامية

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يهدف هذا البحث إلى دراسة بعض العمليات الزراعية التى تساهم فى زيادة إنتاجية محصول الذرة الشامية صنف هجين فردى بيونير ٣٠ ك ٩ وهى معدلات التسميد العضوى (صفر ، ٢ و٤ طن/كمبوست للفدان) ، المسافة بين الجور (٢٠ ، ٢٥ و٣٠ سم بين الجور) ومستويات التسميد النيتروجينى (٥٠ ، ٧٥ ، ١٠٠ و١٢٥ كجم نيتروجين/فدان) وأثر ذلك على نمو ومحصول الذرة الشامية. ولتحقيق هذا الغرض أقيمت تجربتان حقليتان بمحطة التجارب والبحوث الزراعية بكلية الزراعة – جامعة المنصورة خلال موسمى ٢٠٠٦ و ٢٠٠٧م. نفذت كل تجربة فى تصميم الشرائح المتعامدة المنشقة فى أربعة مكررات. ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلى:

أظهرت النتائج المتحصل عليها أن جميع صفات النمو و المحصول و مكوناته تحت الدراسة قد تأثرت معنوياً بمعدلات التسميد العضوى (الكمبوست) فى كلا الموسمين.و نتجت أعلى القيم لجميع الصفات تحت الدراسة بإستخدام المعدل الأعلى من الكمبوست (٤ طن/فدان). بينما نتجت أقل القيم لتلك الصفات من معاملة المقارنة بدون تسميد عضوى) فى كلا الموسمين.

أدت زيادة مسافة الزراعة إلى ٣٠ سم بين الجور (٢٠٠٠٠ نبات/فدان) إلى زيادة معنوية فى جميع الصفات تحت الدراسة فيما عدا صفتى عدد الأيام من الزراعة حتى ظهور ٥٠ % من النورات المذكرة و إرتفاع النبات (سم) فى كلا الموسمين. فى حين تفوقت الزراعة على مسافة ٢٥ سم بين الجور (المسافة المتوسطة) على مسافات الزراعة الأخرى فى محصول الحبوب للفدان.

أدى تسميد محصول الذرة الشامية بـــ ١٢٥ كجم نيتروجين/فدان إلى تفوق معنوى عن مستويات التسميد النيتروجينى الأخرى (٥٠ ، ٧٥ و ١٠٠ كجم نيتروجين/فدان) كما نتج عنها أعلى القيم لكل من صفات النمو ، مكونات المحصول ومحصول الحبوب خلال موسمى الدراسة.

عموما من النتائج المتحصل عليها فى هذه الدراسة يمكن التوصية بزراعة الذرة الشامية صنف هجين فردى بيونير ٣٠ ك ٩ على مسافة ٢٥ سم بين الجور (٢٤٠٠٠ نبات/فدان) وإضافة ٤ طن/فدان كمبوست مع التسميد النيتروجينى بمعدل ١٠٠ أو ١٢٥ كجم نيتروجين/فدان للحصول على أعلى نمو ومحصول تحت ظروف منطقة المنصورة.