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EFFECT OF FERTILIZATION ON PRODUCTIVITY OF MAIZE

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ABSTRACT

Two field experiments were carried out at Abo-Swilam El-ayyat Giza Governorate, Egypt in 2010 and 2011 seasons to study the effect of combinations of four rates from each of farmyard manure (FYM) (5, 10, 15 and 20 m3/fad.), nitrogen (30, 60, 90 and 120 kg/fad.), nitrobein (400g/fad.), phosphorein (400g/fad.) and phosphoric acid at 2%.

Results showed that, there were significant differences between the fertilization treatments for ear weight, grain yield/plant, 100-grain weight, grain yield/fad., P content and protein percentage of grain maize in 2010 and 2011 seasons. The highest values for all studied traits were produced by application of 120 kg N/fad.+ nitrobein and phosphorein followed by 120 kg. N/fad. with nitrobein and phosphoric acid. and 120 kg. N/fad. with nitrobein without significant differences between them in both growing seasons.

INTRODUCTION

Maize (*Zea mays,*L.) is one of the most important food and feed crops grown in Egypt. In order to increase maize productivity, it is necessary to pay particular attention to its nutrient supply. Use of nitrogen fixing bacteria as a biofertilizer can reduce use of chemical fertilizer, decrease environmental pollution and the infection of soil-borne diseases. Many reports indicated that the inoculation of maize seeds plants with associative N-fixing bacteria might improve plant growth and yield. Koreish *et al*. (1990) found that seed treatment with Azotobacter or Azospirllum improved growth, yield and yield component of maize, Omer *et al*. (1991) reported that seed inoculation with some bacteria species of biological nitrogen fixation could save up to half of field rate of N-mineral fertilizer and at the same time increased yields of grain and straw of cereal crops. Mishra *et al.* (1995) and Salem (2000) showed that the interaction between phosphorus rates and inoculation with Biogen had significant affect on most studied characters of maize. Atta-Allah (1998) recorded that seeds inoculation treatment with phosphorein + Microbein or with phosphorein +nitrobein significantly increased yield and yield components of maize.

Organic fertilizers are an important part of environment friendly sustainable agricultural practices. Organic matters constitute an important source of nutrients and are also a key factor in maintaining or improving soil structure., Abd El-Hameed (1997) and Nofal, Fatma (1999) found that application of 20 and 40 ton FYM/fad. significantly increased ear weight, 100-grain weight, grain yield, N% and P% as well as protein content in grains.

Nitrogen fertilizer is an important factor in increasing yield of maize. Many investigators reported that growth attributes and grain yield were positively affected by increasing N fertilizer rate from 90 and 105 to 120 kg N/fad., Matta *et al*.(1990), Bedeer *et al*. (1992), Tantawy (1994), Soliman *et*

al.(1995),Abd El-Hameed (1997) and Nofal, Fatma (1999) recorded considerable increasing in yield and most of its attributes of maize by rising nitrogen fertilizer rate from 90 to 150 kg N/fad., Gouda *et al.* (1993), Mabrouk and Aly (1998) and Haikel and El-Badry (2000) recommended that appling 130 kg N/fad., produced higher yield of maize in new sandy soil. Also, Zeidan *et al.* (1998), and El-Bana and Gommaa (2000) indicated that the grain yield and its attributes of maize responded to N increments up to the highest rate tested (120, 160 and 175 kg N/fad). El-Nagar (2003) reported that mineral nitrogen up to 130 kg N/fad., to significant increase in plant weight, ear height, ear length, seed index, number of rows/ear, number of grain/row, grain yield/fad., compared with other nitrogen rates (60 and 100 kg N/fad.).

Zahran *et al*. (1997) indicated that the application of 75 or 90 kg N/fad., with microbein gave the highest values for plant height, grain weight/plant, ear weight and grain yield of maize. El-Howeity, (2004) and Abd-Alla (2005) found that biofertilizer as the mixture of both nitrobein and microbein with 10 to 140 kg N/fad., gave the best grain yield of maize.

The aim of this present investigation was curred out to study the effect of some fertilizer treatments on yield and yield components of maize at Giza Governorate conditions, Egypt.

MATERIALS AND METHODS

Two field experiments were carried out at Abo-Swilam El-Ayyat Giza Governorate, Egypt in 2010 and 2011 seasons to study the effect of some fertilizer treatments on yield, yield components and some chemical components in grains of maize C.V. single cross hybrid yellow 162.

The Mechanical and chemical analysis for the experimental site according to the standard of Kilmar and Alexander (1959) in the two growing seasons 2010 and 2011 are presented in Table 1.

Table 1: Mechanical and chemical analysis of soil field experiments samples in 2010 and 2011 seasons.

A-Mechanical analysis	**2010 season**	**2011 Season**
Sand	16 %	19.5 %
Silt	35.5 %	37 %
Clay	48.5 %	43.5 %
Soil texture	Clay	Clay
B-Chemical analysis		
pH(1:2.5:soil water suspension)	8.33	8.43
E.C. (ds/m) in soil water extc(1:5)	0.33	0.56
O.M. %	18.78	13.2
Available **N** ppm	40	110
Available **P** ppm	15.6	10.14
Available **K** ppm	910	570

Studied treatments (T)

(T_1)- 20 m^3 Farm yard manure (FYM/fad.)
(T_2)- 20 m^3 (FYM) with phosphorein (400 g. /fad.).
(T_3)- 20 m^3 (FYM) with 2% P_2O_5 as foliar/fad.
(T_4)- 20 m^3 (FYM) with nitrobein (400 g. /fad.)
(T_5)- 20 m^3 (FYM) with nitrobein and phosphorein/fad.
(T_6)- 20 m^3 (FYM) with nitrobein and 2% P_2O_5 as foliar/fad.
(T_7)- 15 m^3 (FYM) with 30 kg. N/fad.
(T_8)- 15 m^3 (FYM) with 30 kg. N. and phosphorein/fad.
(T_9)- 15 m^3 (FYM) with 30 kg. N. and 2% P_2O_5 as foliar/fad.
(T_{10})- 15 m^3 (FYM) with 30 kg. N. and nitrobein/fad.
(T_{11})- 15 m^3 (FYM) with 30 kg. N., nitrobein and phosphorein/fad.
(T_{12})- 15 m^3 (FYM) with 30 kg. N., nitrobein and 2% P_2O_5 as foliar/fad.
(T_{13})- 10 m^3 (FYM) with 60 kg. N/fad.
(T_{14})- 10 m^3 (FYM) with 60 kg. N. and phosphorein/fad.
(T_{15})- 10 m^3 (FYM) with 60 kg. N. and 2% P_2O_5 as foliar/fad.
(T_{16})- 10 m^3 (FYM) with 60 kg. N. and nitrobein/fad.
(T_{17})- 10 m^3 (FYM) with 60 kg. N. , nitrobein and phosphorein/fad.
(T_{18})- 10 m^3 (FYM) with 60 kg. N. , nitrobein and 2% P_2O_5 as foliar/fad.
(T_{19})- 5 m^3 (FYM) with 90 kg. N/fad.
(T_{20})- 5 m^3 (FYM) with 90 kg. N. and phosphorein/fad.
(T_{21})- 5 m^3 (FYM) with 90 kg. N. and 2% P_2O_5 as foliar/fad.
(T_{22})- 5 m^3 (FYM) with 90 kg. N. and nitrobein/fad.
(T_{23})- 5 m^3 (FYM) with 90 kg. N. , nitrobein and phosphorein/fad.
(T_{24})- 5 m^3 (FYM) with 90 kg. N. , nitrobein and 2% P_2O_5 as foliar/fad.
(T_{25})- 120 kg. N/fad.
(T_{26})- 120 kg. N. with phosphorein/fad.
(T_{27})- 120 kg. N. with 2% P_2O_5 as foliar/fad.
(T_{28})- 120 kg. N. with nitrobein/fad.
(T_{29})- 120 kg. N. , nitrobein and phosphorein/fad.
(T_{30})- 120 kg. N. , nitrobein and 2% P_2O_5 as foliar/fad.

Farmyard manure was taken from farmer livestock and applied before sowing, the chemical properties of farm yard manure were used are presented in Table 2.

Table 2: Chemical properties of farm yard manure.

Property	2010 season	2011 season
pH (1:10)	8.48	8.29
E.C. (ds/m)	1.49	1.96
Total **N** %	1.08	0.84
Total **P** %	0.083	0.121
Total **K** %	0.43	0.45
Available **N** %	0.025	0.041
Available **P** ppm	86.3	135.7
Available **K** %	0.38	0.41
O.M. %	24.55	20.30
Organic carbon %	14.24	11.77

Maize grains were inoculated with phosphorein and nitrobein directly before sowing.

Nitrobein: Containing free living nitrogen fixing microorganisms.

Phosphorein: Containing free living bacteria which transform the unavailable form of $Ca_3 (PO_4)_2$ to the available form $Ca (HPO_4)_2$.

Bio-fertilizers are produced and distributed commercially by the General Organization for Agriculture Equalization Found (GOAEF), Ministry of Agriculture and Land Reclamation, Egypt.

Nitrogen fertilizer in the form of urea (46.5 % N) was divided into two equal portions. i.e, the first was added after thinning, immediately before the first irrigation and the other one was added before the second irrigation.

Application of a phosphoric acid as foliar spray at the concentration of 2% P_2O_5 in two equal doses after 30 and 45 days after sowing.

The experimental design of these treatments was randomized complete blocks with three replications. The plot area was 10.5 m^2 (1/400 fad.)

Grains of maize were sown on ridges 70 cm apart and 25 cm between hills at 25th and 21st May and harvested after 110 and 112 days from sowing in 2010 and 2011 seasons, respectively.

The preceding crop was wheat in the two seasons.

Studied characters:-

A- Yield components:

Ten guarded maize plants were chosen at random from each plot at harvest to measued the following traits:

1- Ear weight (g).
2- Grain yield/plant (g).
3- Weight of 100- grain (g).

B- Yield / fadan:

Plants of middle ridges of each plot were harvested, air dried and weighted and multiplied to determine the folloing character:

1- Grain yield /fad., in ardab. (ardab = 140 kg.).

C- Chemical components of grains:

1- Phosphorus percentage: phosphorus was determined by the calorimetric method using spectrophotometer described by Jackson (1973).

2- Crude Protein percentage: Nitrogen was determined using the improved Kjeldahle methods of the A.O.A.C. (1970) modified by distilling the ammonia into boric acid. Protein percentage was calculated by multiplying the total nitrogen in the grain by 6.25.

Statistical analysis:

The obtained data were analyzed according to Snedecor and Cochran (1967) and the treatments compared by the new least significant difference test (N.L.S.D) at 5% level.

RESULTS AND DISCUSSION

Effect of fertilization treatments on growth, yield and yield components of maize are presented in Tables 3 and 4.

Table 3: Effect of fertilization treatments on ear weight/plant, weight of 100-grain and grain yield/plant of maize in 2010 and 2011 seasons.

Fertilizer	Ear weight (g)		100-grain weight (g)		Grain yield/plant (g)	
treatments (T)	2010season	2011season	2010season	2011season	2010season	2011season
T1	144.00	147.00	25.56	26.22	116.00	120.67
T2	148.00	150.33	26.56	26.89	125.00	128.00
T3	146.00	149.67	26.11	26.33	124.33	126.33
T4	150.33	154.67	25.89	26.90	124.33	127.67
T5	162.00	165.33	26.89	27.40	131.00	133.00
T6	159.33	161.00	26.34	27.10	127.67	129.00
T7	147.33	153.67	26.11	26.33	122.00	123.00
T8	156.00	158.67	26.67	27.00	127.00	129.00
T9	149.00	155.67	26.56	26.89	124.33	127.00
T10	157.33	162.33	26.89	27.11	128.00	129.00
T11	163.00	165.33	27.33	27.56	132.00	133.00
T12	162.00	164.00	27.11	27.33	130.33	132.00
T13	154.00	158.33	26.33	26.67	125.00	126.67
T14	163.00	165.33	27.22	27.23	133.67	135.33
T15	161.00	164.33	26.78	27.00	127.00	128.33
T16	170.00	175.33	27.33	27.44	134.67	135.67
T17	172.33	176.33	27.89	28.33	137.33	140.67
T18	171.67	175.67	27.56	27.91	136.33	137.67
T19	162.00	171.00	27.00	27.33	134.00	137.33
T20	167.00	175.33	27.56	28.00	137.00	140.67
T21	165.00	173.00	27.33	27.67	135.67	138.67
T22	174.00	182.00	28.22	28.33	141.00	145.33
T23	178.00	187.00	28.56	28.89	147.00	150.67
T24	176.00	185.00	28.51	28.77	144.67	148.33
T25	171.00	181.67	27.11	27.56	139.00	143.00
T26	176.67	184.00	27.67	28.11	144.00	148.33
T27	175.00	182.33	27.33	27.89	142.00	146.00
T28	177.00	186.00	27.89	28.33	146.33	148.67
T29	181.00	190.67	29.11	29.56	149.33	152.33
T30	179.33	189.00	29.00	29.44	148.00	151.33
L.S.D at 5%	**3.77**	**3.74**	**0.36**	**0.96**	**2.41**	**1.71**

Results showed that there were significant differences between fertilization treatments in ear weight, 100-grain weight, grain yield/plant, grain yield/fad., phosphorus content and protein percentage of maize in during 2010and 2011 seasons.

Results indicated that the treatment having 120 kg N/fad. with nitrobein and Phosphorein (T29) gave the highest values of ear weight (181.00 and 190.67g), weight of 100- grain (29.11 and 29.56 g), grain yield/plant (149.33 and 152.33 g), grain yield/fad.(24.55 and 25.1, arddab), phosphorus content in grains (1990 and 1990 ppm) and grains protein percentage (10.52 and 11.22, %) as compared with other fertilization treatments in the first and second seasons, respectively.

Table 4: Effect of fertilization treatments on grain yield (arddab), phosphorus and protein contents in grains of maize in 2010 and 2011 seasons.

Fertilizer	Grain yield/fad		P (ppm)		protein %	
treatments (T)	2010 season	2011 season	2010 season	2011 season	2010 season	2011 season
T1	19.09	19.75	1800	1810	7.22	7.67
T2	20.57	21.07	1900	1910	7.22	7.67
T3	20.46	20.80	1900	1920	7.22	7.67
T4	20.48	21.01	1900	1910	7.22	7.67
T5	21.56	21.89	1920	1920	7.67	8.12
T6	21.05	21.23	1900	1910	7.22	7.67
T7	20.08	20.25	1860	1870	7.67	8.12
T8	20.90	21.23	1900	1910	7.67	8.12
T9	20.50	20.90	1900	1910	7.67	8.12
T10	21.07	21.25	1900	1910	7.67	8.12
T11	21.75	21.90	1920	1930	8.22	8.67
T12	21.50	21.70	1910	1910	8.12	8.57
T13	20.60	20.90	1800	1810	8.12	8.57
T14	22.00	22.30	1920	1920	8.57	9.02
T15	20.90	21.20	1910	1950	8.57	9.02
T16	22.20	22.40	1920	1930	8.57	9.02
T17	22.74	23.15	1950	1960	9.02	9.47
T18	22.45	22.80	1940	1960	8.92	9.40
T19	22.05	22.60	1850	1860	9.02	9.47
T20	22.60	23.15	1940	1950	9.47	9.92
T21	22.33	22.87	1940	1950	9.92	10.30
T22	23.27	23.95	1940	1950	9.47	9.97
T23	24.20	24.80	1950	1960	9.97	10.42
T24	23.85	24.45	1940	1950	9.92	10.37
T25	22.90	23.55	1940	1950	9.47	9.92
T26	23.70	24.43	1950	1960	9.77	9.92
T27	23.40	24.05	1980	1980	10.22	10.30
T28	24.10	24.50	1980	1980	9.92	10.47
T29	24.55	25.10	1990	1990	10.52	11.22
T30	24.35	24.95	1980	1980	10.37	10.82
L.S.D at 5%	**0.39**	**0.62**				

Results showed that there were significant differences between FYM alone and FYM +Bio fertilizer combination for all studied traits in both seasons. Applying 20 m^3 FYM with nitrobein and phosphorein. (T5) resulted in increase of ear weight by 12.5 %, weight of 100- grain by 5.21%, grain yield /plant by 12.93%, grain yield /fad. by 12.93%, grains phosphorus content by 6.66% and grains protein percentage by 6.23% in the first season, while in the second season the corresponding values were 12.47 % for ear weight, 4.5% for 100, 10.22%, 10.83% in the name respect 6.08% 5.87% protein percentage as compared with the treatment of 20 m^3 FYM/fad. alone (T1).

With respect to 15 m^3 FYM in combination with other fertilizer treatments, results in Tables 3 and 4 show that the highest values for all

studied characters were obtained from 15 m^3FYM with 30 kg N, nitrobein and phosphorein. (T11) in the two seasons, respectively.

Regarding 10 m3 FYM/fad., results show that the highest values for ear weight (172.33 and 176.33, cm), 100- grain weight (27.89 and 28.33, g), grain yield/plant (137.33 and 140.67, g), grain yield/fad., (22.74 and 23.15, arddab), phosphorus content (1950 and 1960, ppm) and protein percentage (9.02 and 9.47 %) were obtained from 10 m^3 FYM with 60 kg N , nitrobein and phosphorein (T17) in 2010 and 2011 seasons, respectively.

With regarding to 5 m^3 FYM, the highest values for ear weight (178.00 and 187.00, cm), weight 100- grain (28.56 and 28.89, g), grain yield/plant (147 and 150.67, g), grain yield/fad. (24.2 and 24.8 arddab), phosphorus content (1950 and 1960 ppm) and protein percentage (9.97 and 10.42 %) were obtained from 5 m3FYM with 90 kg N, nitrobein and phosphorein (T23) in the two seasons, respectively.

With respect to 120 kg N/fad., results showed that there were significant differences between 120 kg N/fad. alone and 120 kg N + nitrobein and phosphorein for all studied traitsin the two seasons. Results also indicated that at the rate of 120 kg N at any bio fertilization as well as P. as a foliar application gave the highest values for all studied traits as compared with the 120 kg N/fad. alone (T25) in the two seasons.

120 kg N with nitrobein and phosphorein/fad. (T29) resulted in an increase in ear weight by 5.85%, weight of 100- grain by7.38%, grain yield/plant by7.43%, grain yield /fad. by 7.2%, grains phosphorus content by 2.58% and protein % by 11.09% in the first season, while in the second season irrespective values were 4.95%, 7.26%, 6.52%, 6.58%, 2.05% and 13.1% as compared with 120 kg N/fad. alone (T25).

From these results, it could be conduced fertilized maize plants by that high nitrogen fertilizer rate (120 kg. N/fad.) with nitrobein and phosphorein. increased filling of grains by increasing photosynthetic productivity of the plants and increasing the in the total grains weight, Also, it could be attributed to the role of nitrogen element in enhancing the vegetative growth of maize plants which were reflected in ear length, 100-grains weight, ear weight and grain yield /fad. These results are completely in agreement with there found by El-Howeity (2004) and Abd-Alla (2005).

Results in Tables 3 and 4 show that increasing nitrogen rate from 30 to 60, 90 and 120 kg/fad. increased all attributes studied these results in agreement with El-Bana and Gommaa (2000) and El-Nagar (2003). Stability with organic and meniral fertilizer rate results show that adding of biofertilizers nitrobein or phosphorein gave the best values for all attributes studed. Similar results were reported by Atta-Allah (1998) and Salem (2000).

It could be recommended that fertilized maize plants by 120 kg N /faddan treated by nitroben as well as phosphorein concentration gave that highest values of yield components, grain yield and chemical contents at EL-Giza Governorate conditions, Egypt.

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تأثير التسميد علي انتاجية الذرة الشامية

الغريب عبد الله الغريب ، ناير ابراهيم درويش ، منير عبدالله عبد العزيز السيد و عماد السيد خليل سليمان

قسم المحاصيل- كلية الزراعة- جامعة الأزهر- القاهرة- مصر.

اجريت تجربتان حقليتان بأبو سويلم مركز العياط –الجيزة- مصر خلال موسمى الزراعة 2010و 2011 لدراسة تأثير بعض المعاملات السمادية على الناتج ومكوناتة ونسبة الفوسفور والبوتاسيوم فى حبوب الذرة الشامية هجين فردى اصفر 162.

وكانت المعاملات السمادية كمايلى:

1-اضافة 20 م3 سماد بلدى / فدان.

2-اضافة 20 م3 سماد بلدى + فوسفورين400جم/فدان.

3-اضافة 20 م3 سماد بلدى + حمض فوسفوريك رشاعلى النباتات تركيز 2% عند عمر 30 و 45 يوم/ فدان.

4-اضافة 20 م3 سماد بلدى + نتروبين 400جم/ فدان.

5-اضافة 20 م3 سماد بلدى + نتروبين + فوسفورين/ فدان.

6-اضافة 20 م3 سماد بلدى + نتروبين + حمض فوسفوريك رشا على النباتات/ فدان.

7-اضافة 15م3 سماد بلدى+30كجم أزوت/فدان.

8-اضافة 15م3 سماد بلدى+30كجم أزوت+ فوسفورين/ فدان.

9-اضافة 15م3 سماد بلدى+30كجم أزوت+حمض فوسفوريك رشاعلى النباتات/ فدان.
10-اضافة 15م3 سماد بلدى+30كجم أزوت+ نتروبين/ فدان.
11-اضافة 15م3 سماد بلدى+30كجم أزوت+ نتروبين + فوسفورين. / فدان.
12-اضافة 15م3 سماد بلدى+30كجم أزوت+ نتروبين + حمض فوسفوريك رشا على النباتات/ فدان.
13-اضافة 10م3 سماد بلدى+60كجم أزوت/فدان.
14-اضافة 10م3 سماد بلدى+60كجم أزوت+ فوسفورين/ فدان.
15-اضافة 10م3 سماد بلدى+60كجم أزوت+حمض فوسفوريك رشا على النباتات/ فدان.
16-اضافة 10م3 سماد بلدى+60كجم أزوت+ نتروبين/ فدان.
17-اضافة 10م3 سماد بلدى+60كجم أزوت+ نتروبين + فوسفورين / فدان.
18-اضافة 10م3 سماد بلدى+60كجم أزوت+ نتروبين + حمض فوسفوريك رشا على النباتات/ فدان.
19-اضافة 5م3 سماد بلدى+90 كجم أزوت/فدان.
20-اضافة 5م3 سماد بلدى+90 كجم أزوت+ فوسفورين.
21-اضافة 5م3 سماد بلدى+90 كجم أزوت+حمض فوسفوريك رشا على النباتات.
22-اضافة 5م3 سماد بلدى+90 كجم أزوت+ نتروبين.
23-اضافة 5م3 سماد بلدى+90 كجم أزوت+ نتروبين + فوسفورين.
24-اضافة 5م3 سماد بلدى+90 كجم أزوت+ نتروبين + حمض فوسفوريك رشا على النباتات.
25-اضافة 120 كجم أزوت/فدان.
26-اضافة 120 كجم أزوت+ فوسفورين / فدان.
27-اضافة 120 كجم أزوت+حمض فوسفوريك رشاعلى النباتات / فدان.
28-اضافة 120 كجم أزوت+ نتروبين/ فدان.
29-اضافة 120 كجم أزوت+ نتروبين + فوسفورين / فدان.
30-اضافة 120 كجم أزوت+ حيوى أزوتى + حمض فوسفوريك رشا على النباتات/ فدان.
وتم تصميم التجربة فى تصميم القطاعات الكاملة العشوائية فى ثلاث مكررات.

ويمكن تلخيص اهم النتائج المتحصل عليها فيما يلى:

أظهرت النتائج اختلافات معنوية بين المعاملات السمادية المستخدمة فى جميع الصفات المدروسة (وزن الكوز، وزن 100 حبة، محصول حبوب النبات، محصول حبوب الفدان،محتوى الفوسفور والبروتين فى الحبوب) فى كلا الموسمين. وادى اضافةالسماد النيتروجينى بمعدل 120 كجم/فدان مع النيتروبين والفوسفورين الى زيادة معنوية فى جميع الصفات المدروسة متبوعةباضافةالسماد النيتروجينى بمعدل 120 كجم/فدان مع النيتروبين وحمض الفوسفوريك رشا على النباتات متبوعة ايضا باضافةالسماد النيتروجينى بمعدل 120 كجم/فدان مع النيتروبين الي زيادة معنوية في جميع الصفات المدروسة متبوعة بالمعاملة رقم 30 ومتبوعا ايضا بالمعاملة رقم 28 ولا يوجد بينهم فرق معنوي لهذه الصفات المدروسة في كلا الموسمين.
ومن النتائج يتضح ان استخدام النيتروجين بمعدل 120 كجم/فدان مع النيتروبين والفوسفورين بمعدل 400جم من كل منهما ادت الى زيادة ناتج محصول الذرة الشامية من الحبوب تحت ظروف محافظة الجيزة- مصر.

قام بتحكيم البحث

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