The Combined Effect of Mineral, Organic and Bio- Fertilizers on the Productivity and Quality of Some Maize Hybrids

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ABSTRACT: Two field experiments were carried out at the Experimental Farm of the Faculty of Agriculture, (Saba Basha) Alexandria University, at Abees region, Alexandria, Egypt, during the two successive seasons of 2010 and 2011 to study the combined effect of mineral, organic and bio- fertilizers on the productivity and quality of some maize hybrids

The experiment design was a split split plot with three replicates. The main results could be summarized as follows: (1) the sheep manure fertilizer at level 15 ton/fed gave the highest mean values for all studied characters. The highest grain yields/fed, (3.17 and 3.09 ton/fed) were obtained by added 15 ton/fed, in 2010 and 2011 seasons (2) Maize hybrids significantly differed in some growth attributes yield and yield components the single cross hybrid 166 was superior than the T. W. C. 352 hybrid in most growth characters yield and yield components. The results revealed that applying 120 kg N + uninoculation caused a significant increase in most studied characteristics.
Keywords: Combined Effect, Nitrogen and Bio-fertilizers, Sheep manure, , Maize Hybrids, Yield and yield components.

INTRODUCTION

Maize (*Zea mays*, L.) as a cereal crop either in the world and in Egypt ranks the third most important cereal crop after wheat and rice. It has a great utility in human consumption, poultry feed and agro- industry. Egypt grows 1.72 million feddans and produced 6.17 million tons of grain, with an average yield of 3.60 ton per feddan in 2009. according to the some reports, Egypt ranks the fourth in the world respect of average productivity after USA, France and Italy, Egypt imports every year about five million ton of maize grains to fill the gap between maize production and consumption.

The organic manure is known to improve the properties of soil by increasing the limited moisture holding capacity. In addition, it can change the chemical properties of soil through lowering pH and extensively. Their beneficial effects are known for long time. Application of organic matter provides many essential nutrients needed by crop plants. The increase in crop yield due to using of animal manure have been imperative many times as resulted, mainly from the nitrogen, phosphorus or potassium or the combination of the three elements(Huang *et al.*, 1993; Amer *et al.*, 1995 and Mekki *et al.*, 1999) .

Furthermore, biofertilization is one of the most important factors used to produce products free from mineral fertilizer that cause environmental pollution problems and high rates of it lead to a decrease the in potential activity of micro flore and the mobility of organic matters. Hence, the attention has been focused on the researches of biofertilization to sale alternative for the chemical fertilizers. Bio-fertilizers play a vital role for increasing the

number of microorganisms and accelerate certain microbial process in the rhizosphere of inoculate soil plants which can change the available forms of nutrients into plants as reported by (Hassanein *et al.* (1997), Attia- Alla (1998), El- Moselhy and Zahran (2003) and Mohamed (2004)) .

Therefore, the objective of this study were: (1) Evaluation the effect of available organic manure levels and biofertilization on the maize growth, yield and its components, (2) Evaluation the interaction among organic manure levels, maize hybrids and N-biofertilization on growth, yield and its components.

MATERIALS AND METHODS

Two field experiments were conducted at the Experimental Farm Faculty of Agriculture (Saba- Basha), Alexandria University, Egypt, during the summer growing seasons of (2010 and 2011) to study the combined effect of mineral, organic and bio- fertilizers on the productivity and quality of some Maize hybrids .

The experiment was designed in a split- split plot with three replicates. The main plots were allocated to the three organic manure levels i.e 5, 10 and 15 ton/fed, the two maize hybrids (S.C. 166 and T.W.C 352) were allocated randomly to the sub plots. While the five N- biofertilization (120 kg N/fed + uninoculation, 100 kg N/fed + 200 g Cerealine, 80 kg N/fed +400g Cerealine, 60 kg N/fed + 600 g Cerealine and 40 kg N/fed + 800 g Cerealine) were arranged in the sub- sub plots. Analysis of chemical and physical properties of the experimental soil (0 to 30 cm) are shown in Table (1-1) according to the method reported by Page *et al.* (1982). The chemical characteustics of sheep manure composition are given in Table (1-2).

Nitrogen fertilizer was applied as urea (46%N) at the rates (40, 60, 80, 100 and 120 kg N/fed) in two equal doses. The first one applied just before the first irrigation and after thinning and the second one was applied just before the second irrigation. Phosphorus fertilizer was applied before planting as calcium- super- phosphate (15.5% P_2O_5) at the rate of 150 kg/fed, Potassium sulphate (48% K_2O) was added before the first irrigation at rate of 150 kg K_2O/fed.

Grains of the two tested hybrids of maize were sown on 30 May in both seasons. Each experimental unit consisted of four ridges 3m length and 0.7 m width. The preceding crop was wheat in the two growing seasons.

Prior to sowing, grain inoculation was carried out using the biofertilizer (Cerealine): An inoculate for all crops containing of Azospirillum, lipoferium and Bacillus polymx produced by Ministry of Agriculture, Egypt.

Inoculation was performed by mixing grains with the appropriate of Cerealine rates using Arabic gum (Arabic gum 5%).

Table (1- 1). Some physical and chemical properties of the experimental soil in 2010 and 2011 seasons

Soil properties	Values	
	2010	2011
Particle size distribution (%)		
Sand	14.40	14.60
Silt	42.20	42.30
Clay	43.40	43.10
Soil texture	Clay loam	Clay loam
Chemical properties		
pH (1:1)	7.90	7.80
EC (1:1), dS/m	3.50	3.60
1- Soluble cations (1:2) (cmo1/kg soil)		
K^+	1.40	1.35
Ca^{++}	14.15	17.30
Mg^{++}	11.20	11.40
Na^{++}	13.50	13.80
2- Soluble anions (1:2) (cmol/kg soil)		
CO^-_3+ HCO^-_3	2.90	2.70
CL^-	19.80	20.15
SO^-_4	12.50	12.40
Calcium carbonate (%)	6.50	7.00
Total nitrogen (%)	0.90	0.85
Available P (mg/kg)	3.70	3.50
Organic matter (%)	1.40	1.50

Table (1- 2). Analysis of the applied organic manure (sheep manure)

pH	7.3
O.M (%)	18.40
OC (%)	21.60
Total (N%)	2.20
Total (P%)	1.20
Total (K%)	1.50
C/N ratio	11.1

Data recorded

The data were obtained from the two middle ridges for growth characters and yield components.

A- Growth characteristics

At 50, 65 and 80 days after sowing a simples of five guarded plants from each sub- sub plot were taken at random to measure plant height (cm), stem diameter (cm), dry weight (g/plant) and ear leaf area (cm^2).

B- Yield and its components

At harvest ten guarded plants were taken from the 2^{nd} and 3^{th} ridges in each sub- sub plots to determine ear length (cm), ear diameter (cm), number of rows/ear, number of grains/row, grains weight/ear (g), ear weight, 100-grains weight (g), shilling %, grain yield ton/fed, which was adjusted to 15.5% moisture content, biological yield (ton/fed) and harvest index.

C- Chemical composition

Was wet- digested with H_2SO_4- H_2O_2 mixture (Lowther, 1980) and the following determination were carried out in the digested solution to determine the following.

1- Total N in grains was determined colorimetrically by N essler's method (Champan and Pratt, 1978).
2- Total P in grains was determined using Vnadomolybate yellow method (Jakson, 1973).
3- Total K in grains was determined using the Flame Spectrophotometer.

All data collected were subjected to statistical analysis of variance according to Gomez and Gomez (1984). The treatments average were compared using L. S. D. test at 0.05 level of significant.

RESULTS AND DISCUSSION

A- Growth attributes

The obtained results, given in Table (2) clearly showed that organic manure levels. exhibited a significant effect on all estimated traits i. e. (plant height (cm), stem diameter (cm), dry weight (g/plant) and ear leaf area (cm^2) at all sampling date in both seasons. Application of 15 ton/fed, organic manure significantly increased all growth attributes at all sampling dates during both seasons. It could be concluded that the positive growth characters and response to sheep manure levels are attributed to increasing nitrogen nutrition as indicated by increased N concentration in plant tissues (Huang *et al.*, 1993; Sharma, 1995).

Results in Table (2) showed that the T. W. C. 352 cultivar was significantly plant height and dry weight (g/plant), but SC. 166 cultivar was significantly stem diameter and ear leaf area at all simple growth dates in both

seasons. The differences between the two maize hybrids under this study could be due to the variation in the genetic make up and interacted to the environmental conditions prevailing during their growth. These results are in a greement with those obtained by Badawi and El-Moursy (1997), Attia- Allah (1998) and El- Bana and Gomaa (2000).

Data in Table (2) show the effect of N- Biofertilizer application on growth of maize hybrid characters (plant height, stem diameter, dry weight/plant and ear leaf area) at all sampling growth dates in the two growing seasons.Growth attributes were improved by the application of 120 kg N/fed + uninoculation which caused significant increases in growth attributes.

The interaction between organic manure levels and maize was significant for some growth characters at different simple growth dates in both seasons. Also, the interaction between organic manure and N- biofertilization was significant for some growth characters at different sampling growth dates in both seasons. First order interaction between maize hybrids and N-biofertilization was significant for some growth attributes at different sampling growth dates. The second order interactions among organic manure, maize hybrids and N- biofertilization were significant for some growth attributes at different sampling growth dates in the two growing seasons.

B- <u>Yield and its components</u>

The results recorded in Tables (2 and 3) showed that yield and its components for the two seasons, were significantly affected by organic manure levels. Application of 15 ton/fed, organic manure significantly increased grain yield/fed, in the both seasons. It could be concluded that the nitrogen fixing bacteria may increase the synthesis of endogenous phytohormones i.e. IAA, Gas and CKs which play an important role in formation of a big active root system which allow more nutrients uptake. The previous results agree more or less, with the finding of Badran (2000), Zeidan and El- Kramany (2001) and Saleh and Nawar (2003).

Table 2. Effect of organic manure levels, maize hybrids and N- biofertilization on some growth attributes at three samples dates in 2010 and 2011 seasons

Treatments	Plant height (cm)						Stem diameter(cm)					
	2010			2011			2010			2011		
	Days after sowing			Days after sowing			Days after sowing			Days after sowing		
	50	65	80	50	65	80	50	65	80	50	65	80
A) Organic levels												
5 ton/fed	74.30c	119.36c	158.46c	83.30b	108.20c	173.86c	1.65b	2.51b	2.82c	1.51c	2.24c	2.47c
10 ton/fed	78.56b	131.83b	175.06b	87.76a	116.93b	187.00b	1.68b	2.22c	3.26b	1.56b	2.35b	2.57b
15 ton/fed	88.40a	145.13a	189.20a	89.43a	121.13a	191.90a	2.00a	2.64a	3.43a	1.73a	2.46a	2.77a
L.S.D. 0.05	2.62	0.95	0.36	2.16	1.72	1.71	0.05	0.06	0.07	0.01	0.01	0.01
B) Maize Cultivars												
S.C. 166	72.00b	127.62b	168.13b	84.80b	111.35b	179.68b	1.83a	2.53a	3.29a	1.70a	2.49a	2.75a
T.W.C. 352	82.84a	136.53a	180.75a	88.86a	119.48a	188.82a	1.67b	2.38b	3.06b	1.49b	2.21b	2.46b
L.S.D. 0.05	0.58	0.28	0.46	1.08	0.96	1.22	0.03	0.06	0.04	0.01	0.01	0.01
C) N-Bio-fertilization												
120kgN+Uninoculation	98.88a	142.16a	185.50b	88.38a	120.16a	190.50a	2.02a	2.86a	3.63a	1.63a	2.41a	2.67a
100kgN+ 200g Cerealine	86.22b	144.22a	186.61a	87.33b	116.72b	187.05b	1.85b	2.65b	3.36a	1.63a	2.38b	2.63b
80kgN+ 400g Cerealine	78.50c	133.77c	175.22c	87.16b	114.72e	184.11c	1.70c	2.41c	3.16b	1.60b	2.36c	2.60c
60kgN+ 600g Cerealine	73.20d	123.05d	167.22d	86.11c	113.33cd	181.94d	1.62d	2.28d	1.58c	1.58b	2.32d	2.56d
40kgN+ 800g Cerealine	68.77e	117.16e	157.66e	85.16d	112.16d	177.66e	1.55c	2.09e	1.50d	1.50d	2.29d	2.53d
L.S.D. 0.05	1.10	0.75	0.53	0.85	1.48	1.76	0.04	0.04	1.01	0.01	0.01	0.01
Interaction												
A × B	*	*	*	*	*	*	n.s.	*	*	*	*	*
A × C	*	*	*	n.s.	n.s.	*	*	*	*	n.s.	n.s.	n.s.
B × C	*	*	*	*	n.s.	n.s.	n.s.	*	*	n.s.	*	n.s.
A × B × C	*	*	*	n.s.	n.s.	n.s.	n.s.	*	*	*	*	n.s.

n.s.=Not significant * = significant

Table 2. Cont.

Treatments	Dry weight / plant /(g)						Ear leaf area(cm^2)					
	2010			2011			2010			2011		
	Days after sowing			Days after sowing			Days after sowing			Days after sowing		
	50	65	80	50	65	80	50	65	80	50	65	80
A)Organic Levels												
5 ton/fed	119.26c	125.12c	134.38c	116.42c	126.64a	131.41c	3.31b	4.18b	4.93b	3.38c	3.45c	4.80c
10 ton/fed	124.16b	129.80b	139.71b	119.29b	129.42b	135.65b	3.72a	4.28a	5.28a	3.41b	3.68b	5.03b
15 ton/fed	132.67a	138.36a	148.78a	122.08a	132.79a	138.15a	4.02a	4.47a	5.28a	3.43a	4.20a	5.29a
L.S.D. 0.05	1.55	2.93	0.88	0.07	0.04	0.03	0.38	0.09	0.18	0.01	0.12	0.01
B)Maize Cultivars												
S.C. 166	121.72b	126.96b	137.20b	118.28b	128.11b	133.36b	3.76a	4.96a	5.41a	3.42a	3.96a	5.19a
T.W.C. 352	129.00a	134.73a	144.42a	120.25a	131.13a	136.78a	3.60b	4.16b	4.92b	3.40b	3.56b	4.94b
L.S.D. 0.05	0.43	1.03	0.59	0.03	0.01	0.01	0.15	0.25	0.24	0.008	0.11	0.03
C)N- Bio-fertilization												
120kgN+Uninoculation	140.26a	145.52a	155.26a	119.69a	130.06a	135.86a	3.93a	4.78a	5.53a	3.41	3.83a	5.08a
100kgN+200g Cerealine	130.81b	137.20b	147.38b	119.48b	129.86b	135.68b	3.68ab	4.17b	5.16ab	3.41	3.74ab	5.06b
80kgN+400g Cerealine	125.82c	132.38c	141.28c	119.29c	129.65c	135.48c	3.65ab	4.46ab	5.27ab	3.41	3.82a	5.05b
60kgN+600g Cerealine	118.12d	122.87d	131.77d	119.10d	129.42d	134.26d	3.61ab	4.08b	5.07ab	3.41	3.71b	5.04b
40kgN+800g Cerealine	110.81e	116.26e	126.37e	118.86c	129.10e	134.07e	3.55b	4.07b	4.82b	3.40	3.70b	5.05b
L.S.D. 0.05	0.90	1.83	0.50	0.05	0.03	0.02	0.15	0.5	0.39	n.s.	0.10	0.01
Interaction												
A × B	*	*	*	*	*	*	n.s.	n.s.	n.s.	n.s.	*	*
A × C	*	*	*	*	*	*	n.s.	n.s.	*	*	*	*
B × C	n.s.	n.s.	*	*	*	*	n.s.	*	*	n.s.	*	*
A × B × C	*	n.s.	*	*	*	*	n.s.	n.s.	*	*	*	*

n.s.=Not significant * = significant

The results in Tables (2 and 3) showed that the SC. 166 hybrid was significantly superior in yield and its components i.e. ear length, ear diameter, no. of rows/ear, no. of grains/row, grain weight/ear, ear weight, 100- grain weight, shilling %, grain yield (ton/fed), biological yield (ton/fed) and harvest index than the T. W. C. 352 hybrid. The SC. 166 out yield significantly the single hybrid in all the studied results were obtained by Abdel- Gawad *et al.* (1995), Hassanein *et al.* (1997) and Badran (2000).

Application of 120 kg N/fed + uninoculation caused a significant increase in ear length, ear diameter, no of rows/ear, no. of grains/row, grain weight/ear, ear weight, 100- grain weight, shilling % grain yield ton/fed, biological yield (ton)/fed and harvest index. This increases in grain yield resulted from the added high nitrogen which improved plant growth and increased yield components i e. number of rows/ear and number of grains/row.

The interaction between organic manure and maize hybrids was significant for yield and some its components in both seasons. The first order interaction between organic manure x N- biofertilization and maize hybrids X N- biofertilization were significant for length, ear diameter, no. of rows/ear, 100- grain weight, shilling %, grain yield /fed, biological yield/fed and harvest index in the first and second seasons, respectively as well as second order interaction among organic manure, maize hybrids and N- biofertilization for yield and most its components in both seasons.

C- Chemical composition

Data of the effect of organic manure levels on N, P and K% of maize seeds. It is clear from obtained results that the highest, N, P and K% were resulted from the sheep manure during both seasons for P% in addition to N% and K% in the second season. Adding organic manure at the rate of 15 ton/fed, increased the mean of N% and K% in the second season and P % in both seasons. The increment in N, P and K % of plant seeds using the treatments of organic manure may be attributed to the increase in the occupancy root zone of plant as a result of adding organic manure. Similar results were obtained by Huang et al.(1993), Amer *et al.* (1995) and Badran *et al.* (2000).

Table 3. Effect of organic manure levels, maize hybrids and N- bio-fertilization on yield and its components during 2010 and 2011 seasons

Treatments	Ear length (cm)		Ear diameter (cm)		No. of rows/ear		No. of grains/row		Ear grains weight (g)		Ear weight (g)	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
A) Organic Levels												
5 ton/fed	21.14c	17.22c	3.94c	4.02	12.01b	11.56a	32.75b	31.05c	170.86c	152.15c	206.90c	182.18c
10 ton/fed	22.30b	18.03b	4.23b	4.12	12.58a	11.95b	33.30b	31.88b	181.15b	163.26b	217.18b	196.12b
15 ton/fed	22.74a	19.50a	4.50a	4.01	13.01a	12.29a	34.32a	32.23a	199.16a	171.88a	239.06a	209.97a
L.S.D. 0.05	0.31	0.09	0.21	n.s.	0.43	0.10	0.56	0.13	4.55	2.17	5.45	4.33
B) Maize Cultivars												
S.C. 166	22.58a	19.33a	4.08b	3.58b	12.79a	12.27a	34.88a	32.60a	203.28a	177.22a	239.10a	203.99a
T.W.C. 352	21.53b	17.18b	4.37a	4.52a	12.28b	11.60b	32.02b	30.84b	164.16b	147.63b	202.99b	179.86b
L.S.D. 0.05	0.06	0.12	0.08	0.08	0.15	0.05	0.14	0.07	3.68	0.92	4.61	1.38
C) N- Biofertilization												
120kgN+Uninoculation	22.60a	18.64a	4.66a	4.15a	12.65ab	12.12a	34.03a	32.27a	199.17a	168.72a	237.87c	201.47a
100kgN+ 200g Cerealine	22.31b	18.38b	4.41b	4.13a	12.87a	12.04b	33.78b	32.03b	188.18b	165.92b	225.38b	198.67b
80kgN+ 400g Cerealine	22.17c	18.21c	4.17c	4.07ab	12.56b	11.93c	33.30c	31.63c	182.86c	161.93c	219.96bc	194.36c
60kgN+ 600g Cerealine	21.82d	18.10d	4.03d	4.02ab	12.36bc	11.80d	33.21c	31.46d	178.03d	158.62d	215.10c	191.12d
40kgN+ 800g Cerealine	21.37e	17.93e	3.83e	3.83b	12.21c	11.79d	32.95	31.18e	170.37c	156.93e	206.92d	186.52e
L.S.D. 0.05	0.09	0.10	0.08	0.17	0.22	0.07	0.15	0.10	3.68	1.14	6.47	2.28
Interaction												
A × B	*	*	n.s.	*	*	*	n.s.	*	*	*	*	*
A × C	*	*	*	n.s.	*	*	*	n.s.	n.s.	n.s.	n.s.	*
B × C	*	*	*	n.s.	*	*	n.s.	n.s.	n.s.	n.s.	n.s.	*
A × B × C	*	*	*	n.s.	*	*	*	*	n.s.	*	n.s.	*

n.s.=Not significant * = significant

Table 4. Effect of organic manure levels, maize hybrids and N- biofertilization on yield and its components during 2010 and 2011 seasons

Treatments	100 grain weight (g)		Shilling (%)		Grain yield (ton/fed)		Biological yield (tan/fed)		Harvest index	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
A) Organic Levels										
5 ton/fed	43.10b	21.15c	82.44b	82.55c	2.80c	2.73c	12.20c	12.66c	22.93c	21.58c
10 ton/fed	43.81a	42.73b	83.17a	83.15b	2.99b	2.93b	12.47b	13.37b	23.30b	21.94b
15 ton/fed	44.19a	43.25a	83.18a	83.76a	3.17a	3.09a	13.41a	13.73a	23.74a	22.49a
L.S.D. 0.05	**0.43**	**0.04**	**0.35**	**0.21**	**0.05**	**0.03**	**0.21**	**0.17**	**0.04**	**0.02**
B) Maize Cultivars										
S.C. 166	45.23a	44.26a	85.02a	84.27a	3.27a	3.18a	13.59a	14.19c	24.24a	22.95a
T.W.C. 352	21.16b	41.16b	80.84b	82.04b	2.71b	2.65b	12.12b	12.32b	22.40b	21.55b
L.S.D. 0.05	**0.21**	**0.03**	**0.11**	**0.17**	**0.06**	**0.01**	**0.14**	**0.08**	**0.12**	**0.01**
C) N- Bio-fertilization										
120kgN+uninoculation	44.07a	42.93a	83.55a	83.67a	3.16a	3.03a	13.45a	13.60a	23.92a	22.28a
100kgN+ 200g Cerealine	44.01b	42.85b	83.33b	83.41b	3.14a	2.98b	13.25b	13.48b	23.66b	22.10b
80kgN+ 400g Cerealine	43.56c	42.68c	82.88c	83.20c	3.00b	2.91c	12.90c	13.34c	23.30c	21.96c
60kgN+ 600g Cerealine	43.29d	42.57d	82.61d	82.86d	2.88c	2.85d	12.53d	13.03d	23.01d	21.80d
40kgN+ 800g Cerealine	41.93e	42.48e	82.27e	82.63e	2.76d	2.82e	12.17e	12.91e	22.72	21.83d
L.S.D. 0.05	**0.23**	**0.03**	**0.17**	**0.10**	**0.07**	**0.02**	**0.12**	**0.09**	**0.14**	**0.02**
Interaction										
A × B	*	*	**n.s.**	**n.s.**	*	*	*	*	**n.s.**	*
A × C	*	**n.s.**	*	*	**n.s.**	**n.s.**	*	*	*	*
B × C	**n.s.**	**n.s.**	*	*	**n.s.**	*	*	*	*	*
A × B × C	**n.s.**	*	*	**n.s.**	*	*	*	*	**n.s.**	*

n.s.=Not significant * = significant

Data in Table (5) showed that (N, P and K%) percentages in grains were significantly affected due to varietal effects in the second season. Whereas, SC. 166 hybrid gave the highest N, P and K% in 2011 season only.

Application of 100 kg N/fed + 200 g Cerealine caused a significant increase in N, P and K% in the second seasons but without significant effect with applying of 120kg N/fed + uninoculation in N, P and K% in the second season. The previous results are compatible with those obtained by Hassanein *et al.* (1997) and Ragab (1998).

The first order and second order interactions were significant for N and K% in the second season only as showed in Table (5).

Table 5. Effect of organic manure levels, maize hybrids and N-biofertilization on N, P and K percentages in grains during 2010 and 2011 seasons

Treatments	N %		P %		K %	
	2010	2011	2010	2011	2010	2011
A) Organic Levels						
5 ton/fed	0.46	0.88c	0.53b	0.84b	1.12	0.91c
10 ton/fed	0.66	0.92b	0.54b	0.94a	1.12	0.95b
15 ton/fed	0.61	1.09a	0.68a	0.98a	1.48	1.00a
L.S.D. 0.05	**ns**	**0.02**	**0.06**	**0.07**	**ns**	**0.02**
B) Maize cultivars						
S.C. 166	0.61	1.01a	0.65	0.98a	1.20	0.98a
T.W.C. 352	0.55	0.92b	0.60	0.87b	1.29	0.92b
L.S.D. 0.05	**ns**	**0.01**	**ns**	**0.05**	**ns**	**0.01**
C) N- Biofertilization						
120kgN+uninoculation	0.59	1.00a	0.69	0.94a	1.25	0.95b
100kgN+ 200g Cerealine	0.56	1.01a	0.52	0.96a	1.12	0.97a
80kgN+ 400g Cerealine	0.63	0.97b	0.73	0.92ab	1.10	0.95bc
60kgN+ 600g Cerealine	0.48	0.93c	0.56	0.92ab	1.35	0.95bc
40kgN+ 800g Cerealine	0.64	0.90d	0.58	0.86b	1.39	0.94c
L.S.D. 0.05	**ns**	**0.02**	**ns**	**0.06**	**ns**	**0.008**
Interaction						
A × B	**ns**	*	**ns**	**ns**	**ns**	*
A × C	**ns**	*	**ns**	**ns**	**ns**	*
B × C	**ns**	*	**ns**	**ns**	**ns**	*
A × B × C	**ns**	*	**ns**	**ns**	*	*

The investigation suggests the need for more studies concerning the effect of organic manure levels, maize hybrids N- biofertilization and their interaction, as well as applying micronutrients on maize plant under different environments using different types of soil to reach to the optimum combination to achieve the best yield and its combination.

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الملخص العربي

التأثير المشترك للتسميد المعدني والعضوي والحيوي على إنتاجية وجودة بعض هجن الذرة الشامية

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أقيمت تجربتان حقليتان بمزرعة كلية الزراعة سابا باشا . جامعة الإسكندرية . بمنطقة أبيس – إسكندرية (مصر) أثناء موسمي الزراعة 2010، 2011 بهدف دراسة التأثير المشترك للتسميد المعدني والعضوي والحيوي على إنتاجية وجودة بعض هجن الذرة الشامية حيث صممت التجربة بتصميم القطع المنشقة مرتين مع استخدام ثلاث مكررات.

وكانت التوصية كما يلي:

- التسميد العضوي (زبل الغنم) عند معدل 15 طن/فدان أعطى أعلى متوسط لكل الصفات المدروسة حيث أدى إضافة 15 طن/فدان إلى الحصول على أكبر محصول للحبوب/فدان (3.17، 3.09 طن/فدان) في عامي 2010، 2011 على التوالي.
- اختلفت هجن الذرة الشامية معنوياً في بعض الصفات الخضرية والمحصول ومكوناته بتفوق الهجين الفردي 166 مقارناً بالهجين الثلاثي 352 في معظم الصفات الخضرية والمحصول ومكوناته.
- أوضحت النتائج أن إضافة 120 كجم/فدان + بدون تلقيح أدت إلى زيادة معنوية في معظم الصفات المدروسة.