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EFFECT OF NITROGEN, PHOSPHORUS AND BIO FERTILIZERS ON MAIZE: II. YIELD AND ITS COMPONENTS

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ABSTRACT

Two field experiments were carried out during two summer seasons 2001 and 2002 at the experimental Farm, Faculty of Agriculture, Kafr El-Sheikh, Tanta University to study the effect of [bio fertilizer notroben + phosphorus]with levels of nitrogen and phosphorus fertilization on yield and its components of maize plants of cultivar [single cross 10].

The results obtained could be summarized as follows

A- Nitrogen levels plus notroben:

1- Addition of high dose of nitrogen [120 kg N/fed] alone caused a significant effect on ear length, straw yield /fed in ton, grain yield/plant in gm and feddan in ardab and crude protein percentage.
2- Addition of 60 kg N/fed plus notroben results in a significant increase in weight of 100 kernels..
3- Nitogen levels [90 kg N/fed] plus notroben caused a significant increase in shelling percentage seed index, straw yield /fed in ton and grain yield per plant in gm and per fed Dan in ardab
4- 120 kg N/fed plus notroben resulted in a significant effect on ear length, shelling percentage, grain yield per plant in gm or per fed Dan in ardab, crude protein percentage, straw yield /fed in ton and seed index..

B- Phosphorus levels plus phosphoren:

1- 15 kg P_2O_5/fed alone caused a significant increase in shelling percentage and seed index
3- 7.5 kg P_2O_5/fed plus phosphoren gave the significant increase in grain yield per fed Dan in ton, seed index, protein percentage and ear length, straw yield (ton/fed.).
4- 15kg P_2O_5/fed plus phosphoren resulted in a significant increase in ear length, grain yield in ardab or ton, straw yield /fed in ton and crude protein percentage..

C- Interaction effect:

The significant interaction was found on straw yield /fed in ton, ear length, grain yield per plant in gm or in ardab or ton and seed index. From the obtained results, it could be recommended that the use of bio fertilizer to minimize the chemical nitrogen fertilizer, reduced the costs of production and pollution which could be occurred be excessive use of chemical fertilizer.

INTRODUCTION

In Egypt, maize [*Zea mays* L] is one of the most important cereal crops used for human consumption and many other purposes such as animal feeding one to rich sources of carbohydrate, oil and some what of protein. Nitrogen is a major nutrient element and it is needed in large amount for high yield of maize, it considers the most factor affecting the growth and productivity of maize plants. Moreover, encouraged the photosynthesis at higher levels which led to an increase in dry matter production in the different organs of the plants [Esmail and EL Sheikh, 1994]. Concerning phosphorus fertilizer, it is an important nutrient in plant life where it is used in trans formed of chemical energy to stable organic compounds from which dry matter is

produced [Gardner et al, 1986]. The effect of combined inoculate Azotobacter and phosporen on the growth in the several plants was found of great interest. Mishra *et al.* 1995 showed that grain yield of maize increased with inoculation by Azotobacter and phosphoren. The aim of this investigation is to study the effect of nitrogen and phosphorus fertilization plus bio fertilizer treatments on yield and its components of maize [S.C.10] variety.

MATERIALS AND METHODS

Two experiments were carried out at Farm of the Faculty of Agriculture at Kafr EL Sheikh during the summer seasons at 2001 and 2002 seasons.

The soil is clay in texture contained 1.66 and 1.50 organic matter and 5ppm available N, 14.5 and 13.8 available P_2O_5 and 420 and 452 ppm available K and had pH of 7.95 and 7.86 in the two seasons, 2001 and 2002, respectively. The preceeding crop was wheat in the two seasons. Every experiment included sixteen treatments was performed to investigate the combination of four levels of nitrogen and phosphorus fertilization expressed as apportions from the recommended dose [120 kg N/fed and 15 kg P_2O_5/fed] with four replications were randomly distributed as follow:

1- 120 kg N without addition of bio fertilizer as follow, one fourth dose at sowing date +half dose at first irrigation + fourth dose at second irrigation.
2- 60 kg N plus notroben as follow, 15kgN at sowing date + 30 kg N at the first irrigation +15 kg N at second irrigation.
3- 90; kg N plus notroben as follow; 15 kgN at sowing date + 45kg N at the first irrigation +30 kg N at second irrigation.
4- 120 kg N plus notroben as follow; 30 kg N at sowing date + 60 kg N at the first irrigation +30 kg N at the second irrigation.

Seeds were inoculated with bio fertilizer before sowing at a rate of ½ kg with 15 kg of maize seeds and phosphorus fertilizer in form of calcium super phosphate [15.5 % P_2O_5] as follow; 1-Unfertilized 2-15 kg P_2O_5 3-7.5 kg P_2O_5 plus phosphoren 4-15 kg P_2O_5 plus phosphoren

At harvest, ten guarded plants were taken and the following characters were recorded. Plants were harvested and three ridges with ten guarded plants were taken random and grain yield was determined on the basis of 15.5 percent moisture, ear height in cm ear length in cm ear diameter in cm number of rows /ear, number of kernels /ear, 100 kernels weight in gm, selling percentage, grain yield per plant in gm and per fed Dan in ardab and in ton and straw yield /fed in ton. Grain quality ; protein percentage was determined according to the improved Kjeldahl methods of Association Official Agricultural Chemicals [A.O.A.C., 1980] crude protein percentage was calculated by multiplying the total nitrogen for each sample by 6.25.

All the data were subjected to the standard analysis of variance procedure to Snedecor and Cochran 1967 and Duncan 1955. Also, percentage data were presented before transformed in scale.

RESULTS AND DISCUSSION

A- Nitrogen levels plus notroben:

1- Addition of the high dose of nitrogen[120 kg N/fed] caused a significant effect on Ear length [Table 1], it could be attributed to the increase in N levels which enhanced the vegetative growth and dry matter content of maize plants and accelerates the rate of ear cells division in both directions. Generally, nitrogen has major roles in plant nutrition namely, component of chlorophyll and amino acids, essential for carbohydrates utilization, components of enzymes, vitamins and hormones, simulative of root development and activity and supportative the uptake of other nutrients [Stevenson 1986]. These results are in general agreement with those reported by Nawar *et al.* 1992, Esmail and EL Skeikh 1994, EL Kady *et al.* 1996, EL Agamy *et al.* 1999 and EL Dowby *et al.* 2001 on straw yield /fed in ton, grain yield per plant in gm in the first season and grain yield /fed in ardab in the second season. These results show that N fertilizer caused more vigours growth in plant height and dry weight of total plant and its organs and in turn increased straw yield. Said *et al.* 1999 found that increasing N levels up to 120 kg /fed caused a significant increase in crude protein.

2- Nitrogen levels 90 kg N /fed plus notroben caused a significant increase in shelling percentage, seed index, [Table 8] straw yield /fed in ton [Table 12] and grain yield per plant in gm in the two seasons and grain yield /fed in ardab in second season [Table 15], number of rows /ear in first season, number of kernels /row and ear length in both seasons and on number of kernels /ear in second season [Table 4].

3- Addition of the high dose of nitrogen 120 kg N/fed plus notroben caused a highly significant effect on ear length, shelling percentage, grain yield per plant in gm or per fed Dan in ardab or tons at age of 80 day in second season, crude protein percentage in both seasons [Table 20] and straw or grain yield per feddan in ton in first season and seed index in the second season, number of kernels /row in season 2001 number of kernels /ear in season 2002 and ear height in both seasons, [Table 4]. These results may be attributed to the nitrogen fixation by non symbiotic bacteria present in notroben for their ability to fix free molecular nitrogen. Stimulate germination, improve plant stand, synthesis of chlorophyll, secret growth hormones and consequently increases uptake of nutrients by plants.So, an improve in soil properties and uptake of micro nutrients could be expected. This reflect on growth characters

B. Effect of phosphorus levels plus phosphoren;

1- The high dose of 15 kg P_2O_5 /fed all one caused a significant increase in seed index in the second season [Table 8] and number of rows/ear in the first season. These results showed that the element of phosphorus is an important role in plant life where it is used in transformation of chemical energy to stable organic compound from which dry matter is produced [Gardener *et al.* 1986].

2- Addition of 7.5 kg P_2O_5/ fed plus phosphoren gave the significant increase in weight of 100 kernels in both seasons, straw yield per fed

Dan in tons in season 2002 [Table 12] and on grain yield per feddan in ton [Table 15], number of rows/ ear in the first season, ear height in both seasons, number of kernels per row [Table 4], crude protein percentage in the first season [Table 20].

3- The high dose of phosphorus fertilization [15 kg P_2O_5/fed] plus phosphoren resulted in a significant increase ear length in season 2002, straw or grain yield /fed in ton in the first season and grain yield per plant in gm or per fed Dan in ardab in both seasons, number of rows /ear in the first season, number of kernels per row and ear height in both seasons [Table 4] and crude protein percentage in the second season. These results show that phosphate dissolving bacteria [phosphoren] are considered as a biological fertilizer which have an important role in solubility of P and enhance its absorption by the roots [Azcon *et al.* 1976 and Kuncey 1988]. Increasing plant dry matter due to inoculation with phosphoren was attributed to the reduction of media PH and hence the solubility of phosphate [Kuncey, 1988]. Increasing plant dry matter due to inoculation with phosphoren was attributed to the reduction of media PH and hence the solubility of phosphate [Kuncey, 1988]. Khalil *et al.* 2001 found that phosphorus levels effects reached of the significant level for straw yield during the two seasons. Sharma and Mahender Singh 1971 reported that grain yield increased with application of 67 kg P_2O_5/ha plus phosphoren inoculated seeds than on those sown with non inoculated seeds. These results are in agree with those obtained by Mehana 1988, Surendra and Sharanappe 2000 and khalil *et al.* 2001.

C- Interaction effect;

1- The significant interaction was found between nitrogen plus notroben and phosphorus fertilizer plus phosphoren on the following characters and the best resulted in shelling percentage in the both seasons [90 or 120 kg N/fed plus notroben and 15 kg P_2O_5 /fed alone]or with 7.5 and 15 kg P_2O_5/fed plus phosphoren [Table 10].

2- The highly significant interaction on ear length in the first season [120 kg N /fed plus notroben + 15 kg P_2O_5 /fed alone] and in the second season [120 kg N8fed plus notroben + 15 kg p2 o5 /fed plus phosphoren], [Table2 and 3] and on seed index in the first season [120 kg N/fed plus notroben + 15 kg P_2O_5 /fed plus phosphoren] [Table 9] and on shelling percentage in both season [90 kg N /fed plus notroben +15 kg P_2O_5 /fed alone] [Table 9 and 10], also on straw yield /fed in ton in the first season [120 kg N /fed plus notroben +15 kg P_2O_5 /fed plus phosphoren], Table 13] and in the second season [90 kg N /fed plus notroben + 15 kg P_2O_5 / fed alone] [Table 14] and on grain yield per plant in gm in the first season [120 kg N /fed plus notroben + 15 kg P_2O_5 /fed plus phosphoren] [Table 16] and in the second season [120 kg N /fed alone + 15 kg P_2O_5 /fed alone] [Table 17] or grain yield /fed in ardab in the first season [120 kg N /fed plus notroben +15 kg P_2O_5 /fed alone] [Table 18] and in the second season [90 kg N /fed plus notroben +15 kg P_2O_5 /fed alone] [Table 19] and on number of rows /ear in the first season [120 kg N /fed alone + 15 kg P_2O_5 /fed plus phosphoren] and on number of kernels per ear in the first season [Table 5] or on ear height in the first season [90 kg N /fed

plus notroben + 7.5 kg P_2O_5 plus phosphoren], while in the second season [90 or 60 kg N /fed plus notroben + 7.5 kg P_2O_5 /fed or 15 kg plus phosphoren], Table 3.

From the obtained results, it could be recommended that the use of bio fertilizer to minimize the chemical nitrogen fertilizer, reduce the costs of production and pollution which could be occurred by excessive use of chemical fertilizer.

Table (1):Ear length (cm) as influenced by different levels of nitrogen and phosphorus with or without biofertilizer during 2001 and 2002 seasons.

Treatments	2001	2002
A. Nitrogen with biofertilizer		
120 kg N/fed.	16.70 b	18.41 a
60 + notrobin	15.66 c	16.89 b
90 + notrobin	16.33 ab	18.82 ab
120 + notrobin	17.00 a	19.16 a
F. Test	**	**
B. Phosphorus with biofertilizer		
Zero	16.05	17.56 c
15 kg/fed.	16.64	18.89 b
7.5 + phosphoren	15.68	17.81 bc
15 + phosphoren	16.23	19.66 a
F. Test	NS	*
eraction A x B	**	**

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (2):Interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	16.450 ad-	16.350 a-d	17.025 abc	17.000 abc
N_2	15.725 bcd	16.350 a-d	15.050 d	15.550 cd
N_3	14.938 d	16.000 bcd	17.850 a	16.550 a-d
N_4	17.100 abc	17.875 a	17.225 ab	15.825 bcd

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (3):The interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2002 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	18.050 d-g	17.950 d-g	18.050 d-g	19.625 bc
N_2	16.175 h	16.850 gh	17.050 gh	17.500 efg
N_3	18.800 b-e	18.950 bcd	17.550 efg	20.000 b
N_4	17.250 fgh	19.250 bcd	18.600 c-f	21.550 a

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (4):Yield components as influenced by different levels of nitrogen and phosphorus with or without biofertilizer during 2001 and 2002 seasons.

Treatments	Ear diameter(cm)		Number of kernels/row		Number of kernels/ear		Ear height (cm)	
	2001	2002	2001	2002	2001	2002	2001	2002
A. Nitrogen with biofertilizer								
120 kg N/fed.	504.0	624.4 a	131.8	133.3	4.04	4.84	40.9 a	45.4 ab
60 + notrobin	592.4	573.1 b	ab	ab	4.15	4.75	38.4 b	42.9 c
90 + notrobin	514.5	627.3 a	127.0 b	129.3 b	4.18	5.01	40.9 a	46.0 a
120 + notrobin	511.6	613.7 a	136.8 a	138.1 a	4.14	5.04	40.3 a	44.2 c
			134.3 a	136.4 a				
F. Test	NS	**	*	*	NS	NS	**	**
B. Phosphorus with biofertilizer								
Zero	502.9	595.7	130.7	132.7	3.98	4.72	40.6 b	43.5 b
15 kg/fed.	517.0	595.5	ab	ab	4.207	4.88	39.36 c	43.7 b
7.5+phosphoren	494.5	629.1	127.6 b	129.7 b	4.174	4.92	39.1 c	46.2 a
15 + phosphoren	508.1	620.1	135.8 a	137.8 a	4.160	5.12	41.0 a	45.2 a
			135.3 a	13.72 a				
F. Test	NS	NS	*	*	NS	NS	*	**
eraction								
A x B	NS	NS	**	**	NS	NS	**	NS

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (5):Number of kernels/row and affected by interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	43.20 a	38.60 c-f	36.63 f	43.13 a
N_2	40.40 a-e	39.06 b-f	36.46 f	37.93 def
N_3	41.66 abc	37.93 def	42.66 a	41.46 abc
N_4	37.43 ef	41.80 ab	40.64 a-d	41.53 abc

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (6):Ear height (cm) as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	141.65 ab	130.32 b-e	123.00 def	130.15 b-e
N_2	116.15 f	121.32 ef	138.86 abc	132.00 a-e
N_3	135.00 a-e	132.65 a-e	145.15 a	134.60 a-e
N_4	130.22 b-e	126.15 c-f	136.40 a-d	144.65 ab

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (7):Ear height as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2002 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	143.65 ab	132.50 b-e	125.05 def	132.15 b-e
N_2	118.42 f	123.37 cd	140.89 abc	134.00 a-e
N_3	134.75 a-e	134.72 a-e	147.20 a	135.97 a-e
N_4	132.27 b-e	128.30 c-f	138.40 a-d	146.93 a

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (8):Weight of 100-kernels (g) and shelling percentage as influenced by different levels of nitrogen and phosphorus with or without biofertilizer during 2001 and 2002 seasons.

Treatments	Wight of 100-kernels(g)		Shelling %	
	2001	2002	2001	2002
A. Nitrogen with biofertilizer				
1- 120 kg N/fed.	31.83 b	33.38 b	83.77 b	82.81 b
2- 60 + notrobin	33.73 a	33.78 b	83.39 b	81.96 b
3- 90 + notrobin	34.70 a	35.39 a	86.25 a	85.16 a
4- 120 + notrobin	33.34 ab	35.98 a	86.15 a	85.37 a
F. Test	**	**	**	**
B. Phosphorus with biofertilizer				
1- Zero	32.20 b	33.66 b	83.36 c	81.83 c
2- 15 kg/fed.	33.08 b	35.22 a	86.74 a	85.73 a
3- 7.5 + phosphoren	35.13 a	36.04 a	85.22 ab	84.31 ab
4- 15 + phosphoren	33.18 b	33.61 b	85.24 bc	83.43 bc
F. Test	**	**	**	**
Interaction A x B	**	NS	**	*

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (9):Weight of 100-kernels (g) as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	31.83 bc	33.015 abc	34.53 ab	27.95 d
N_2	31.70 bc	34.22 ab	34.65 ab	34.35 ab
N_3	33.34 abc	34.95 ab	36.05 a	34.45 ab
N_4	31.95 bc	30.15 cd	35.30 ab	35.96 a

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (10):Shelling percentage as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	78.27 d	85.73 ab	86.44 ab	84.64 abc
N_2	82.91 bc	85.94 ab	83.55 bc	81.17 cd
N_3	86.30 ab	88.55 a	84.06 bc	86.08 ab
N_4	85.96 ab	86.73 ab	86.85 ab	85.08 ab

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (11): Shelling percentage as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2002 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	77.26 d	84.92 a	85.45 a	83.83 abc
N_2	79.87 cd	84.92 a	82.80 abc	80.27 bcd
N_3	85.26 a	86.76 a	83.31 abc	85.33 a
N_4	84.71 a	86.54 a	85.69 a	84.32 a

Table (12): Straw yield(ton/fed) as influenced by different levels of nitrogen and phosphorus with or without biofertilizer during 2001 and 2002 seasons.

Treatments	Straw yield	
	2001	2002
A. Nitrogen with biofertilizer		
120 kg N/fed.	6.07 ab	4.08 ab
60 + notrobin	6.57 ab	3.48 c
90 + notrobin	6.70 a	4.25 a
120 + notrobin	7.04 a	3.75 bc
F. Test	*	**
B. Phosphorus with biofertilizer		
Zero	6.15 b	3.22 c
15 kg/fed.	6.48 b	4.06 ab
7.5 + phosphoren	6.54 b	4.33 a
15 + phosphoren	7.21 a	3.75 b
F. Test	**	**
eraction		
A x B	**	**

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (13): Straw yield(ton fed) as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	4.82 d	6.36 c	6.08 c	7.04 abc
N_2	6.02 c	6.75 bc	6.40 c	7.11 abc
N_3	6.10 c	6.33 c	7.68 ab	6.68 bc
N_4	7.67 ab	6.46 c	6.02 c	8.00 a

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (14): Straw yield/fed. as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2002 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	3.07 ef	3.80 b-f	5.60 a	3.85 b-e
N_2	3.32 def	3.85 b-e	3.15 ef	3.60 c-f
N_3	3.25 ef	5.55 a	4.20 bc	4.03 bcd
N_4	3.25 ef	3.05 f	4.40 b	4.30 bc

Table (15): Grain yield per plant (g) and per feddan as influenced by different levels of nitrogen and phosphorus with or without biofertilizer during 2001 and 2002 seasons.

Treatments	Grain yield/plant (g)		Grain yield/fed. (ardab)	
	2001	2002	2001	2002
A. Nitrogen with biofertilizer				
120 kg N/fed.	139.31 a	179.09 ab	22.37 ab	24.57 a
60 + notrobin	121.17 b	166.55 b	17.40 c	19.79 b
90 + notrobin	139.46 a	185.21 a	21.83 b	24.14 a
120 + notrobin	137.82 a	184.78 a	23.48 a	25.61 a
F. Test	**	*	**	**
B. Phosphorus with biofertilizer				
Zero	138.65	167.39	19.6 b	21.7 c
15 kg/fed.	129.57	182.21	20.5 b	22.5 bc
7.5 + phosphoren	131.47	181.27	21.2 b	22.9 ab
15 + phosphoren	138.08	184.77	23.4 a	24.1 a
F. Test	NS	NS	**	**
eraction A x B	**	**	**	**

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (16): Grain yield/plant (g) as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	155.85 a	113.58 c	132.96 abc	154.88 a
N_2	133.16 abc	125.47 bc	112.47 c	113.09 c
N_3	145.04 ab	133.78 abc	147.38 ab	131.65 ab
N_4	120.54 c	145.43 ab	133.09 abc	152.22 a

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (17): Grain yield/plant as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2002 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	156.06 d	202.84 a	183.73 abc	175.72 a-d
N_2	175.32 bcd	155.04 d	167.95 cd	167.90 c-d
N_3	186.50 abc	188.16 abc	171.95 cd	199.81 abc
N_4	153.67 d	182.80 abc	202.01 ab	200.63 ab

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (18): Grain yield/fed. (ardab) as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2001 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	22.63 bcd	21.73 d	25.37 abc	285.46 a
N_2	16.77 e	21.08 d	22.14 cd	19.22 de
N_3	21.73 d	22.48 bcd	25.55 ab	26.83 a
N_4	29.75 ab	27.05 a	22.58 bcd	27.08 a

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (19): Grain yield/fed. (ardab) as influenced by the interaction between nitrogen and phosphorus fertilization plus biofertilizer in 2002 season.

Nitrogen with bioferitlizer	Phosphorus with biofertilizer			
	P_1	P_2	P_3	P_4
N_1	28.83 g	26.96 fg	29.88 efg	30.10 g
N_2	28.65 c-f	25.67 abc	26.57 d-g	24.26 abc
N_3	30.71 a-d	31.41 bc	27.64 abc	31.26 ab
N_4	27.48 d-g	34.15 a	32.15 abc	32.60 ab

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

Table (20): Protein percentage as influenced by different levels of nitrogen and phosphorus with or without biofertilizer during 2001 and 2002 seasons.

Treatments	Protein percentage	
	2001	2002
A. Nitrogen with biofertilizer		
120 kg N/fed.	9.4 a	9.6 a
60 + notrobin	8.2 c	8.7 b
90 + notrobin	8.8 b	9.0 b
120 + notrobin	9.4 b	9.9 a
F. Test	**	**
B. Phosphorus with biofertilizer		
Zero	8.7 b	9.2
15 kg/fed.	8.6 b	9.1
7.5 + phosphoren	9.1 a	9.3
15 + phosphoren	9.2 a	9.6
F. Test	**	NS
eraction		
A x B	NS	NS

In the same column, means followed by the same letter are not significantly different at 5% level according to Duncan multiple range test

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تاثيرالتسميدالنتروجيني والفوسفوري مع التسميد الحيوى علي الذرة الشامية: ٢- المحصول ومكوناته

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أقيمت تجربتان حقليتان في موسمي الزراعة ٢٠٠١ و٢٠٠٢ بمزرعة كلية الزراعة بكفر الشيخ جامعة طنطا لدراسة تأثير التسميد النتروجيني والفوسفوري والحيوي علي المحصول ومكوناته علي صنف الذرة الهجين الفردي ١٠ ومن خلال النتائج يمكن تلخيص الأتى:

ا- تأثير التسميد النتروجيني مع التسميد الحيوي:

١- أدى إضافة ١٢٠ كيلو نتروجين للفدان بمفرده إلى تأثير معنوي فى طول الكوز ومحصول القش بالطن ومحصول الحبوب للنبات الفردي بالجرام وللفدان بالإردب ونسبة البروتين الخام

٢- أدى إضافة ٦٠ كيلو نتروجين للفدان مع النتروبين إلى زيادة معنوية فى وزن ١٠٠ حبة

٣- أدى إضافة ٩٠ كيلو نتروجين مع النتروبين إلى زيادة معنوية فى نسبة التفريط و وزن ١٠٠ حبة ومحصول القش للفدان بالطن ومحصول الحبوب للنبات الفردي بالجرام وللفدان بالإردب

٤- أدى إضافة ١٢٠ كيلو نتروجين مع النتروبين إلى زيادة معنوية فى نسبة التفريط ومحصول النبات الفردي بالجرام وللفدان بالاردب أو بالطن ونسبة البروتين الخام ومحصول الفدان بالطن ووزن ١٠٠ حبة

ب- تأثير السماد الفوسفوري مع الفوسفورين:

١- أدى إضافة ١٥ كيلو فوسفور للفدان بمفرده إلى زيادة معنوية فى نسبة التفريط ووزن ١٠٠ حبة

٢- أدى إضافة ٧,٥ كيلو فوسفور للفدان مع الفوسفورين الي زيادة معنوية فى محصول الحبوب للفدان بالطن ووزن ١٠٠ حبة ونسبة البروتين الخام ومحصول الكيزان للفدان بالطن

٣- أدى إضافة ١٥ كيلو فوسفور للفدان مع الفوسفورين إلى زيادة معنوية في طول الكوز ومحصول الحبوب للفدان بالإردب أو بالطن ومحصول القش للفدان بالطن ونسبة البروتين الخام

ج-تأثير التفاعل:

كان تأثير التفاعل معنوي فى محصول القش بالطن للفدان فى طول الكوز ومحصول الحبوب للنبات الفردي بالجرام وللفدان بالإردب ووزن ١٠٠ حبة. ومن النتائج المتحصل عليها يمكن التوصية باستعمال السماد الحيوي مع السماد الكيماوي لتقليل التكاليف مع الحصول علي إنتاجية عالية وتقليل التلوث من استخدام الأسمدة الكيماوية