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EFFECT OF PRECEDING WINTER CROPS, NITROGEN AND PHOSPHORUS FERTILIZER LEVELS ON GROWTH AND YIELD OF MAIZE (*Zea mays* L.)

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ABSTRACT

The Present study was conducted at Tag EL - Ezz Agricultural Research Station, Dakahlia Governorate, during 2000 and 2001 seasons to study the effect of some preceding winter crops, i.e. faba bean, wheat, and sugar beet, nitrogen fertilizer levels i.e. 60,90,120 and 150 kg N / fad. and phosphorus fertilizer levels i.e. 0, 15 and 30 kg P_2O_5 / fad. on growth, yield and its attributes of maize (cv. S.C.10). A split plot design with four replications was used .The main results could be summarized as follows:

Preceding winter crops had significant effects on plant height, stem diameter, ear length, ear diameter, number of rows/ear, number of grains / row, grains yield / plant, 100-grain weight, plants carried two ears percentage, shelling percentage and grain yield ardab /fad in both seasons. Aforementioned traits were superior when maize was grown after faba bean. The results indicated that increasing fertilizer nitrogen levels from 60 to 150 kg N/fad recorded significantly increase in all studied characters in both seasons. Raising phosphorous fertilizer levels up to 30 kg P_2O_5/fad resulted in a significant increase in all studied characters in both seasons, except number of grains/row in the first season.

The interaction between preceding winter crops and nitrogen fertilizer levels indicated that faba bean as previous crop with 150 kg N/fad gave the highest values of maize grain yield in both seasons. The interaction of nitrogen with phosphorus fertilizer levels showed that the highest values of grain yield /plant of maize were obtained with 150 kg N/fad and 30 kg P_2O_5 /fad in both seasons.

Generally it could be concluded that cultivation of maize after faba been and fertilized by 150 kg N/ fad and 30 kg P_2O_5/fad could be the best treatments for raising maize production under the conditions of Tag EL -EZZ district according the results of this investigation.

INTRODUCTION

Maize (*Zea mays* L.) is a great importance crop for both human and animal feeding. It ranks the third position among cereal crops after wheat and rice. Many factors affect grain yield of maize such as genetic constitution, fertilization , preceding crops. Maize grown after legume crops produce more grain than after non – legume crops. This may be due to lower utilization and more addition of soil available nitrogen by legumes than by cereals (Maccoll, 1990 and Oyer and Touchton, 1990). Seif El- Nasr *et al.* (1993) showed that the values of maize characters grown after faba bean were higher than when grown after wheat. Hussein *et al.* (1998) found that sowing maize after chickpea gave the highest values in plant height, stem diameter, ear leaf area, ear height, 2-ear plants percentage, ear length, ear diameter, ear weight, number of rows/ear, number of grains/row, grain yield/ear, shelling percentage, 100-grain weight and grain yield/fad. Whereas, sowing maize

after fodder beet gave the lowest values in all studied characters of maize. Farghly (2001) showed that the highest values of growth, yield and yield components characters of maize were obtained from grown maize after faba bean. Abd EL-All (2002) found that maize preceded by faba been markedly surpassed those preceded by wheat or sugar beet in growth, yield and its components.

With respect to the effect of nitrogen fertilizer levels, El – Kassaby and El-Kalla (1981) and Khedr (1986) reported that plant height, ear length, 100-grain weight and grain yield /fad of maize gradually increased as the rate of nitrogen was increased up to 120 Kg N/fad. While Salem *et al.* (1983) found that plant height, yield and yield components characters of maize were not significantly increased by increasing nitrogen level. Whereas Badr (1991), Abusteit (1993), Seif El-Nasr *et al.* (1993) and Awad *et al.* (1994) reported that there were increases in growth characters by application of 75 Kg N/fad. While more incremental doses did not induce any change in these characters. They added that, the best yield components were accompanied by the application of 75 kg N/fad. to 90 kg N/fad. for ear length to 105 kg N/fad. for 100-kernel weight, Younis *et al.* (1995), El- Far (1996) and Hegazy *et al.* (1996) found that, increasing nitrogen levels up to 135 Kg N/fad. produced the highest grain yield / plant, Hussein *et al.* (1998) reported that increasing nitrogen level up to 125 Kg N/fad, significantly increased all studied maize characters. Farghly (2001) found that all growth characters of maize were increased by increasing nitrogen levels up to 120 kg N/fad.

Many investigators have been reported the response of maize plants to phosphorus application. In this respect Ashoub *et al.* (1987) found that increasing phosphorus fertilizer up to 45 kg P_2O_5/fad, significantly increased plant height, ear leaf area, ear length, ear weight/ plant, 100-grain weight and grain yield /fad, Salama *et al.* (1989), Diab *et al.* (1990), and El-Hamidi *et al.* (1990) found that plant height and leaf area were increased with adding 57.5Kg P_2O_5 /fad. They added that, phosphorus application significantly increased the grain yield as will as weight of 100-grain as the rates of phosphorus fertilization increased. Finally, Das *et al.* (1991); Plenet *et al.* (1992); El-Far (1996) and Hegazy *et al.* (1996) showed that leaf area, ear length, 100-grain weight, and grain yield /fad, were significantly increased by increasing phosphorus levels. Badawi and El-Moursy (1997) found that increasing phosphorus rates from 15.5 to 30 kg P_2O_5/fad induced favorable effect on plant height, ear length and grain yield /fad. This work aimed to study the effect of some preceding winter crops, nitrogen and phosphorus fertilization on growth, yield and yield components of maize.

MATERIALS AND METHODS

Two field trials were conducted at Tag El-Ezz Agricultural Research Station Dakahlia Governorate in 2000 and 2001seasons to study the effect of some preceding winter crops i.e. faba bean, wheat and sugar beet, four nitrogen fertilizer levels i.e. 60, 90, 120 and 150 kg N/fad and three phosphorus fertilizer levels i.e. 0, 15 and 30 kg P_2O_5 /fad. on growth, yield and yield components of maize (Cv. S.C.10). A combined experiment in a split plot

design with four replications was used. Each previous crop was evaluated in a separate experiment. Each one was laid-out in split plot design the main plots were allocated for nitrogen fertilizer levels. While sub-plots were devoted to phosphorus fertilizer levels.

Each experiment basic unit included 5 ridges, each of 70 cm apart and 3.00 m long, composing an area of 10.5 m^2 (1/ 400 fad).

Concerning the previous winter crops, faba been and sugar beet seeds took place on 25th October in both seasons. Sowing date of wheat was on 20th and 18th November in the first and second seasons, respectively. Normal cultural practices for faba bean, wheat and sugar beet crops were normally adopted.

The grains of maize were sowing on one side of ridge in hills 30 cm apart on 23rd and 25th May in the first and second seasons, respectively. Plants were thinned to one plant / hill before the first irrigation to gave 20000 plants/ fad. Phosphorus was applied as Calcium superphosphate (15.5 % P_2O_5) at the aforementioned rates in one dose before the first irrigation. Nitrogen fertilization treatments were added in two equal doses in the form of ammonium nitrate (33.5 %N), at the aforementioned rates in two equal doses before the first and second irrigation. Potassium sulphate (48 % K_2O) at a rate of 50 kg/fad, was applied in two split doses,1/2 with super phosphate and 1/2 at grain formation

Soil analysis:

Samples of soil were collected from the surface layer (0-30 cm) after harvesting winter crops in the two seasons. The samples were analyzed for estimating nitrate according to Kieldahl method as described by Jakson (1958), available P according to Olsen *et al.* (1954), and K was determined by flame photometrically using E.E.L flame photometer as mentioned by Richards (1945). The field soil was clay in texture and available N, P, and K are presented in Table 1.

Table (1): Available N, P and K (ppm) and pH of soil after faba bean, wheat and sugar beet in 2000 and 2001 seasons.

Chemical analysis	Before preceding crops	After preceding crops					
		Faba been		Wheat		Sugar beet	
		2000	2001	2000	2001	2000	2001
N	28 ppm	41	37	30	28	26	24
P	9.0 ppm	12.0	11.8	11.5	11.4	11.2	11.1
K	200 ppm	207	220	200	210	188	180
PH	8.0	8.0	8.0	8.0	8.1	8.0	7.9

Studied characters:

A- Growth characters:

1- Plant height (cm)

2- Stem diameter (mm)

3- Leaf area of topmost ear (cm^2): It was calculated by the following equation:

$$a = l \times w \times 0.75$$, according to (Stickler, 1964)

where :a = leaf area, l = leaf length ,w = maximum width of leaf

B- Yield components:

At harvest time, ten guarded plants were taken at random from the middle rows of each treatments to determine the following data:

1- Ear length (cm).
2- Ear diameter (mm).
3 -Number of rows / ear.
4 - Number of grains / row.
5 - Grain yield / plant (g).
6 - Hundred grain weight (g).
7- Plants carried two ears percentage.
8 -Shelling percentage.

C -Grain yield (ardab / fad):

It was determined from the weight of grains adjusted to 15.5 % moisture content of the three central ridges of each plot and converted to ardab/fad.

Obtained data were subjected to the statistical analysis as the usual technique of analysis of variance (ANOVA) of the combined analysis in split plot design as mentioned by Gomez and Gomez (1984). The treatment means were compared using the least significant difference (LSD) procedure.

RESULTS AND DISCUSSION

1 - Effect of preceding winter crops

Data presented in Tables (2, 3 and 4) show the effect of preceding winter crops on growth, yield and yield components of maize during 2000 and 2001 seasons. Results clear that the all estimated characters were significantly affected by the preceding crops in both seasons, except leaf area of topmost ear. Maize preceded by faba bean was superior in all the studied characters as compared with those preceded by wheat or sugar beet. Wheat as winter preceding crop came in the second rank after faba been, whereas sugar beet ranked the third in this concern. The superiority of faba bean as a preceding crop to maize than wheat and sugar beet could be attributed to the favourable effect of legume crops in improving the physical, chemical and biological properties of the soil. Planting maize after faba bean resulted in an increase in grain yield/fad at a rate of 5.6 and 14.6% in the first season and were 6.4 and 15.5 % in the second season compared with those preceded by wheat and sugar beet, respectively. The increase in maize grain yield when planted after faba been may be due to the residual effect of N-fixed biologically by the preceding legume crop. These results were coincided with those obtained by Maccoll (1990), Oyer and Touchton 1990), Seif El- Nasr *et al.* (1993), Hussein *et al.* (1998), Farghly (2001) and Abd EL-All (2002).

2- Effect of N-fertilizer levels:

Nitrogen fertilizer levels had significant effect on all the studied characters (Tables 2, 3 and 4). Raising nitrogen fertilizer levels from 60 to 150 kg N / fad led to increasing in values of plant height, stem diameter, leaf area of topmost ear, ear length and diameter, number of rows/ear, number of grains/row, grain yield/plant, 100-grain weight, plants carried two ears percentage as well as shelling percentage and grain yield/fad in both seasons.

Table 2: Averages of plant height (cm), stem diameter (mm), leaf area of topmost ear (cm^2) and ear length (cm) as affected by preceding winter crops, nitrogen and phosphorous fertilizer levels in 2000 and 2001 seasons.

Characters / Treatments	Plant height (cm)		Stem diameter (mm)		Leaf area of topmost ear (cm^2)		Ear length (cm)	
	2000	2001	2000	2001	2000	2001	2000	2001
Preceding winter crops:								
Faba been	287.9	283.6	20.6	20.3	694.9	540.2	20.6	20.1
Wheat	282.9	278.6	19.4	18.9	660.2	520.1	19.8	19.2
Sugar	276.6	273.9	19	18.4	640.9	506.7	19.4	19.0
F-test	**	**	**	**	N.S.	N.S.	**	**
LSD at 5%	1.47	2.78	0.05	0.20	--	--	0.11	0.19
N-fertilizer levels (kg N/fad):								
60	274.7	271.5	17.9	16.9	597.3	471.1	17.2	16.6
90	280.6	276.9	19.6	18.9	665.5	510.6	18.9	18.4
120	285.9	281.8	20.3	20.1	689.4	548.7	21.2	20.8
150	288.6	284.6	20.7	20.8	709.1	558.9	22.3	22.1
F-test	**	**	**	**	**	**	**	**
LSD at 5%	1.15	1.60	0.13	0.20	4.32	2.23	0.11	0.15
Phosphorus fertilizer levels (kg P_2O_5/fad):								
0	280.7	277.3	19.2	18.8	648.1	513.2	19.2	18.8
15	282.6	278.8	19.7	19.2	670.1	524.8	20.1	19.6
30	284.1	280.1	20.0	19.6	677.7	529.1	20.5	20.0
F-test	**	**	**	**	**	**	**	**
LSD at 5%	0.70	1.31	0.12	0.87	3.39	3.26	0.10	0.12
Interaction:								
A x B	NS	NS	NS	**	**	NS	NS	NS
A x C	NS	NS	NS	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	NS	NS	NS	NS
A x B x C	NS	NS	NS	NS	NS	NS	NS	NS

The increase of growth characters (plant height, stem diameter, leaf area of topmost ear) by adding nitrogen might be attributed to stimulating effect of nitrogen on the meristematic activity of the maize plant. Grain yield of maize /fad was related to yield component characters. So, there was a consistent and remarkable increase in maize grain yield by increasing a level of nitrogen fertilizer up to 150 kg N/fad in both seasons. Increasing nitrogen levels from 60 to 90 to 120 up to 150 kg N/fad significantly increased maize grain yield from 18.1 to 20.1, 22.7 and 24.5 ardab/fad in the first season and from 16.6 to 18.8, 22.0 and 23.3 ardab/fad in the second season. The increase in grain yield /fad may be attributed to the role of nitrogen in activation of the growth and hence increasing yield components. Similar results were obtained by El-Kassaby and El- Kalla (1981), Khedr (1986), Younis *et al.* (1995), El- Far (1996), Hegazy *et al.* (1996), Hussein *et al.* (1998) and Farghly (2001).

Table 3: Averages of ear diameter (mm), number of rows/ear, number of grains/row and grain yield/plant (g) as affected by preceding winter crops, nitrogen and phosphorous fertilizer levels in 2000 and 2001 seasons.

Characters	Ear diameter (mm)		No. of rows /ear		No. of grains /row		Grain yield /plant (g)	
Treatments	2000	2001	2000	2001	2000	2001	2000	2001
Preceding winter crops:								
Faba been	46.3	44.2	13.2	13.0	48.5	45.8	178.1	173.2
Wheat	41.1	40.8	12.9	12.8	44.2	42.4	165.8	159.7
Sugar	40.4	39.9	12.7	12.6	39.5	38.3	157.2	152.1
F-test	**	**	**	**	**	**	**	**
LSD at 5%	0.22	1.04	0.11	0.07	1.59	0.32	0.68	1.27
N-fertilizer levels (kg N/fad):								
60	39.3	37.1	12.4	12.2	37.4	35.9	139.7	133.9
90	42.1	40.6	12.7	12.4	40.1	39.5	158.6	152.9
120	43.8	42.8	13.3	13.1	46.9	44.9	176.7	171.8
150	45.3	46.1	13.6	13.5	51.9	49.6	193.0	187.9
F-test	**	**	**	**	**	**	**	**
LSD at 5%	0.31	1.20	0.10	0.07	1.38	0.22	1.42	1.10
Phosphorus fertilizer levels (kg P_2O_5/fad):								
0	41.5	40.4	12.8	12.6	42.9	41.0	154.3	149.3
15	42.8	41.5	13.0	12.8	44.6	42.7	171.6	165.9
30	43.7	43.1	13.1	12.9	44.7	43.7	175.2	170.0
F-test	**	**	**	**	NS	**	**	**
LSD at 5%	0.14	1.02	0.06	0.05	--	0.12	1.04	0.93
Interaction:								
A x B	NS	NS	NS	NS	NS	NS	**	**
A x C	NS	NS	NS	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	NS	NS	**	**
A x B x C	NS	NS	NS	NS	NS	NS	NS	NS

3- Effect of phosphorus fertilizer levels:

Data in Tables (2, 3 and 4) show the effect of phosphorous fertilizer levels on growth and productivity of maize in both seasons. Results clear that phosphorous fertilizer levels had significant effects on plant height, stem diameter, leaf area of topmost ear, ear length, ear diameter, number of rows/ear, grain yield/plant and 100-grain weight, plants carried two ears percentage as well as shelling percentage and grain yield /fad in both seasons and number of grains /row in the second season. The increasing of phosphorous fertilizer levels from 0 to 30 kg P_2O_5 /fad increased all studied traits as compared with those of the control in both seasons. These increases may be attributed to the effect of phosphorus on plant growth and consequently to the efficiency of the roots in absorbing various nutrients. Adding 30 kg P_2O_5 /fad produced the maximum grain yield (21.9 and 20.9 ardab/fad) in the first and second seasons, respectively. The increase in grain yield of maize due to high dose of phosphorous fertilizer application could be attributed to the higher photosynthesis and translocated rate of photosynthates from leaves to ears and grains. These results are in harmony

with those obtained by Ashoub *et al.* (1987), Salama *et al.* (1989), Diab *et al.* (1990), El–Hamidi *et al.* (1990), Das *et al.* (1991), Plenet *et al.* (1992), El- Far (1996), Hegazy *et al.* (1996) and Badawi and El-Moursy (1997).

Table 4: Averages of 100-grain weight (g), plants carried two ears %, shelling % and grain yield ardab/fad as affected by preceding winter crops, nitrogen and phosphorous fertilizer levels in 2000 and 2001 seasons.

Characters	100-grain weight (g)		Plants carried two ears %		Shelling %		Grain yield (ardab* / fad)	
Treatments	2000	2001	2000	2001	2000	2001	2000	2001
Preceding winter crops:								
Faba been	41.5	39.9	27.2	24.9	82.4	81.7	22.8	21.6
Wheat	40.2	37.9	24.4	22.3	81.2	80.5	21.6	20.3
Sugar	37.3	36.4	22.7	19.8	80.6	80.0	19.9	18.7
F-test	**	**	**	**	**	**	**	**
LSD at 5%	0.74	0.15	0.22	0.21	0.18	0.13	0.09	0.10
N-fertilizer levels (kg N/fad):								
60	36.0	33.7	21.7	19.3	80.5	79.6	18.1	16.6
90	38.5	36.9	23.8	21.4	81.1	80.3	20.1	18.8
120	40.9	39.7	25.8	23.6	81.6	80.8	22.7	22.0
150	43.0	41.9	27.6	25.0	82.3	81.7	24.5	23.3
F-test	**	**	**	**	**	**	**	**
LSD at 5%	0.86	0.16	0.20	0.13	0.14	0.11	0.08	0.10
Phosphorus fertilizer levels (kg P_2O_5/fad):								
0	38.2	36.9	24.4	22.0	81.1	80.3	20.6	19.4
15	40.3	38.4	24.8	22.4	81.4	80.6	21.4	20.3
30	40.5	39.0	25.0	22.6	81.6	80.9	21.9	20.9
F-test	**	**	**	**	**	**	**	**
LSD at 5%	0.68	0.12	0.80	0.08	0.11	0.12	0.08	0.08
Interaction:								
A x B	NS	**	**	**	NS	NS	**	**
A x C	NS	NS	NS	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	NS	NS	NS	NS
A x B x C	NS	NS	NS	NS	NS	NS	NS	NS

*** Ardab = 140 kg of shelled grains.**

4- Interaction effects:

Tables (5 and 6) show that grain yield / plant, plants carried two ears percentage and grain yield ardab/fad of maize were significantly influenced by the interaction between preceding crops and nitrogen fertilizer levels in 2000 and 2001 seasons, leaf area of topmost ear in the first season and stem diameter and 100-grain weight in the second season. Planting maize after faba bean and adding 150 kg N /fad recorded the highest values for these characters, whereas planting maize after sugar beet and adding 60 kg N / fad was recorded the opposite for these characters. Grain yield / plant of maize was significantly affected by the interaction between nitrogen and phosphorus fertilizer levels in the first and second seasons as shown in Table (6). The highest value for this character was obtained by application 150 kg N and 30

kg P_2O_5 /fad, whereas the lowest value was obtained by application 60 kg N / fad with unfertilized of phosphorous fertilizer in both seasons.

It could be concluded that the highest grain yield of maize could be obtained by planting faba bean as preceding crops and fertilizing maize plants with 150 kg N / fad and 30 kg P_2O_5 / fad in this district according the results of the present investigation.

Table 5: Stem diameter (cm), ear leaf area of topmost ear (cm^2), 100-grain weight, grain yield/plant (g), plants carried two ears % and grain yield/fad as affected by the interaction between preceding crops and nitrogen fertilizer levels in 2000 and 2001 seasons.

Preceding crops	Nitrogen fertilizer levels (kg N/fad)	Stem diameter (mm)	Leaf area of topmost ear (Cm^2)	100-grain weight (g)	Grain yield /plant (g)		Plants carried two ears %		Grain yield (ardab/fad)	
		2001	2000	2001	2000	2001	2000	2001	2000	2001
Faba been	60	18.5	619.2	35.4	145.8	141.0	24.4	22.1	19.4	18.3
	90	20.3	689.6	38.6	169.8	164.1	26.1	24.0	21.7	20.4
	120	21.1	723.8	42.0	189.1	185.1	27.9	25.9	24.2	23.4
	150	21.4	747.2	43.8	207.7	202.5	30.1	27.5	25.7	24.5
Wheat	60	16.3	593.3	33.4	140.1	133.3	21.2	18.9	17.8	16.8
	90	18.5	662.2	36.9	156.7	151.2	23.3	21.3	20.1	18.9
	120	19.9	680.2	39.2	175.2	168.7	25.7	23.5	22.7	22.0
	150	20.7	704.9	41.9	191.2	185.6	27.5	25.3	24.4	23.4
Sugar beet	60	15.9	579.4	32.3	133.3	127.7	19.6	16.8	17.0	14.9
	90	18.1	644.6	35.3	149.3	143.6	22.0	19.0	18.3	17.3
	120	19.4	664.2	37.9	165.9	161.5	23.7	21.2	21.2	20.6
	150	20.2	675.3	40.0	180.3	175.9	25.3	22.3	23.4	22.1
F-test		**	**	**	**	**	**	**	**	**
LSD at 5%		0.34	7.48	0.27	2.46	1.91	0.34	0.21	0.13	1.73

Table 6: Grain yield /plant (g) as affected by the interaction between nitrogen fertilizer levels and phosphorus fertilizer levels in 2000 and 2001 seasons.

Nitrogen fertilizer levels (kg N/fad)	Phosphorus fertilizer levels (kg P_2O_5/fad)	Grain yield/ plant (g)	
		2000	2001
60	0	130.9	124.8
	15	142.6	136.5
	30	145.7	140.6
90	0	143.8	138.5
	15	164.1	158.4
	30	168.4	162.1
120	0	162.5	157.9
	15	182.0	176.9
	30	185.7	180.4
150	0	180.4	175.9
	15	197.6	192.1
	30	201.1	195.8
F-test		**	**
LSD at 5%		2.07	1.86

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تأثير بعض المحاصيل الشتوية السابقة ومستويات السماد النتروجيني والفوسفاتى على نمو ومحصول الذرة الشامية

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أقيمت تجربتان حقليتان بمحطة البحوث الزراعية بتاج العز – محافظة الدقهلية خلال موسمي الزراعة ٢٠٠٠و٢٠٠١ لدراسة تأثير بعض المحاصيل السابقة الفول البلدي و القمح و بنجر السكر ومستويات السماد النتروجيني (٦٠و٩٠و١٢٠و١٥٠ كجم نتروجين / فدان) ومستويات السماد الفوسفاتي (بدون تسميد و ١٥و٣٠ كجم فوءاه فدان) علي النمو والمحصول ومكوناته للذرة الشامية (هجين فودي ١٠) وقد استخدم تصميم القطع المنشقة مرة واحدة فى أربع مكررات. ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلى :

١ــ كان للمحاصيل الشتوية السابقة تأثيرا معنويا علي ارتفاع النبات و سمك الساق وطول وسمك الكوز وعدد حبوب الصف ووزن حبوب الكوز ومحصول الحبوب /نبات ووزن ١٠٠ حبة والنسبة المئوية لكلا من النباتات التى تحمل كوزين والتفريط ومحصول الحبوب بالأردب للفدان خلال موسمي الزراعة. وقد أشارت النتائج إلى تفوق الذرة الشامية المنزرع عقب الفول البلدي بالمقارنة بالمنزرع عقب قمح أو بنجر سكر في كل الصفات المدروسة خلال موسمى الدراسة.

٢ــ أدت زيادة معدل التسميد النتروجيني من ٦٠ إلى ١٥٠ كجم نتروجين/فدان إلى زيادة معنوية فى كل الصفات تحت الدراسة خلا الموسمين.

٣ــ أدت زيادة معدل التسميد الفوسفاتى من صفر إلى ٣٠ كجم فوءاه/فدان إلى زيادة معنوية فى كل الصفات تحت الدراسة خلال موسمى الزراعة عدا صفة عدد الحبوب / صف فى الموسم الأول.

٤ــ أدى التفاعل بين المحاصيل السابقة والتسميد النتروجيني إلى الحصول على أعلى محصول حبوب بالأردب /فدان للذرة الشامية وذلك عند زراعة الذرة عقب الفول البلدى والتسميد النتروجينى بمعدل ١٥٠ كجم نتروجين/ فدان وكذلك أدى التفاعل بين معدلات السماد النتروجينى والفوسفاتى إلى الحصول على أعلى محصول حبوب/ نبات وذلك عند التسميد النتروجينى للذرة بمعدل ١٥٠ كجم نتروجين للفدان والتسميد الفوسفاتى بمعدل ٣٠ كجم فوءاه للفدان خلال موسمى الدراسة.

عموما توصي الدراسة بزراعة الذرة الشامية عقب الفول البلدي مع إضافة السماد النتروجيني بمعدل ١٥٠كجم / فدان والسماد الفوسفاتي بمعدل ٣٠ كجم / فدان وذلك لزيادة انتاج الذرة الشامية تحت ظروف منطقة تاج العز – دقهلية.