ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 44(4): 1407-1420. (2006).

INFLUENCE OF ORGANIC AND MINERAL FERTILIZATION ON PHOTOSYNTHETIC PIGMENTS, FLOWERING, YIELD COMPONENTS AND SOME NUTRIENTS CONTENT IN FABA BEAN.

BY

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ABSTRACT

Two field experiments were carried out at the south Tahrir Agric., Res. Station, Agric., Res. Center. Ali Moubarak Village. El Bustan Region, El Behira Governorate during 2004/2005 and 2005/2006 seasons. This study was performed to throughout some light on the effect of organic fertilizer (farmyard manure and chicken manure) and phosphorus fertilizer rates (0, 15, 30 and 45 kg P_2O_5/fad) as well as their interactions on yield of faba bean.

The obtained results could be summarized as follows:

1- Photosynthetic pigments, numbers of flowers, setting pods and pods/plant, 100-seed weight, seed yield/plant and seed and straw yields/fad of faba bean were increased with chicken manure than farmyard manure during two seasons, while abscission percentage was reduced in this respect.
2- The highest values of photosynthetic pigments, numbers of flowers and setting pods/plant as well as yield and its components were obtained with application of 45 kg P_2O_5/fad, while the flowers, pods and total abscission percentage were significantly decreased.
3- Chicken manure caused an increase in macronutrients i.e. (N, P and K) and micronutrients i.e. (Fe, Mn, Zn and Cu) concentrations and their uptakes in seeds and straw of faba bean more than farmyard manure during the two seasons.
4- The highest values of macronutrients and micronutrients uptake and concentration in seeds and straw of faba bean were recorded with application of 45 kg P_2O_5/fad.
5- The interaction between chicken manure and 45 kg P_2O_5/fad gave the best results of yield and its components and macro and micronutrients concentration and uptake in faba bean.

INTRODUCTION

As faba bean takes the first place among the most important legumes raised in Egypt, back-up research has been focused on this particular crop to maximize its production through increasing the efficiency of fertilization.

In the last two decades, the use of organic manure has been suggested to facilitate crop growth, yield and its yield components and nutrients uptake in newly reclaimed lands (Wassif *et al.*, 1997 and El-Shafie and El-Shikha 2003). Organic fertilizers (farmyard manure and chicken manure) are one of the natural amendments which correct and improve both chemical and physical properties of the soils and increase the yield which planting on this soils. In this point El-Awaga *et al.*, (1992), Kaoud (1994) and El-Nagar *et al.*, (2002) pointed that organic manure caused increase the yield of sunflower, wheat and faba bean in sandy soil.

Phosphorus is very important element to plant growth and plays a key role in metabolic processes such as the conversion of sugar into starch and cellulose (Mengel and Kirkby 1997). Thampson and Troeh (1979) showed that, P is needed in cell divisions, at formation, transformation of starch seed germination, synthesis of nucleoproteins and some other vital processes El-Shafie (1994) Abou Hussien *et al.*, (2002) and El-Shikha (2005) studied the effect of P application in different soils on the growth, yield components and nutrients uptake in rice and broad bean, they found that the application of P and organic fertilization increased the dry matter yield of roots, shoots and grains.

The objective of the present work was to study the effect of organic fertilization and phosphorus fertilizer rates and their interaction on yield and yield components of faba bean and some macro and micronutrients uptake.

MATERIALS AND METHODS

Two field experiments were carried out at the south Tahrir Agric., Res. Station, Agric., Res. Center. Ali Moubarak Village. El Bustan Region, El Behira Governorate during 2004/2005 and 2005/2006 seasons. This study was performed to throughout some light on the effect of organic fertilizer and phosphorus fertilizer rates on photosynthetic pigments abscission, yield and its components as well as macro and micronutrients content in faba bean plants.

Soil samples were taken, before planting from surface layer (0-30 cm) for physical and chemical analysis according to Jakson (1973). Some physical and chemical characteristic of the soil samples and organic manure (farmyard manure and chicken manure) were shown in Table (1-a and 1-b).

Each experiment included eight treatments which were the combination of two organic manure i.e. (farmyard manure and chicken manure) and four levels of phosphorus fertilizer i.e. (0, 15, 30 and 45 kg P_2O_5/fad). The preceding crop was maize in both seasons. A split plot design with four replications was used in both seasons. Organic manure were randomly allocated in the main plots, while phosphorus fertilizer levels occupied in the sub plots. The plot area was 10.5 m^2 (3 m length and 3.5 m width). Seeds of Giza blank a cultivar were sown on 5th and 8th November in the first and second seasons, respectively. Nitrogen fertilizer was applied in the form of urea (46.0% N) at a rate 20 kg N/fad before the first irrigation. Normal cultural practices of growing faba bean plants were done.

Table (1-a): Some physical and chemical properties of the top experimental soil during 2004/2005 and 2005/2006 seasons.

Properties	2004/2005	2005/2006
Sand %	91.15	89.75
Silt %	5.74	6.85
Clay %	3.11	3.40
Texture class	Sandy soil	Sandy soil
O. M. %	0.13	0.14
pH	8.11	8.17
$CaCO_3$	4.65	4.62
EC, ds m^{-1}	0.73	0.74
N ppm	20.40	20.12
P ppm	1.86	1.84
K ppm	55.50	53.45
Fe ppm	0.65	0.61
Mn ppm	0.25	0.22
Zn ppm	0.18	0.19
Cu ppm	0.08	0.07

Table (1-b): Some characteristics of two organic manure under study.

Properties	Farmyard manure	Chicken manure
pH (1:10)	7.35	8.25
EC, ds m^{-1} (1:10)	1.40	2.05
$CaCO_3$	1.30	4.65
O. M. %	35.10	48.70
Total N %	1.05	2.10
Available P %	0.06	0.13
Available K %	0.55	1.15
Available Fe ppm	38.50	82.30
Available Mn ppm	88.70	115.35
Available Zn ppm	22.30	72.50
Available Cu ppm	9.10	12.50

Characters studied

I- Photosynthetic pigments

Chlorophyll a, chlorophyll b and carotenoids were determined from fresh leaves at 80 days after sowing using spectrophotometer method as described by Wettestein (1957).

II- Numbers and abscission of flowers and pods

1- Number of flowers/plant.

2- Number of setting pods/plant.

3- Percentage of abscission flowers/plant =

$$\frac{\text{Number of flowers/plant - Number of setting pods/plant}}{\text{Number of flowers/plant}} \times 100$$

4- Percentage of abscission pods/plant =

$$\frac{\text{Number of setting pods/plant - Number of pods at harvest/plant}}{\text{Number of setting pods/plant}} \times 100$$

5- Total abscission percentage =

$$\frac{\text{Number of flowers/plant - Number of pods at harvest/plant}}{\text{Number of flowers/plant}} \times 100$$

III- Yield and yield components

At harvest, ten guarded plants were taken at random from each sub plot to determine number and weight of pods/plant, 100-seed weight and seed yield/plant. A fixed area of 4 m^2 was harvest from each plot to determine seed and straw yields/fad (kg.).

IV- Macro and Micronutrients uptake

Samples of both seeds and straw were taken at harvest for determining N, P and K as well as Zn, Mn, Fe and Cu uptake according to Chapman and Pratt (1961).

The data were statistically analyzed according to the method described by Gomez and Gomez (1984). LSD test at 5% level of significance was used for comparison between the mean of different treatments.

RESULTS AND DISCUSSION

I- Photosynthetic pigments

Differences among the two tested organic manure and mineral phosphorus levels in chlorophyll a, chlorophyll b and chlorophyll (a+b) are shown in Table (2). Chicken manure surpassed farmyard manure in chlorophyll a, chlorophyll b and chlorophyll (a+b) in both seasons. Chlorophyll a, chlorophyll b and chlorophyll (a+b) were significantly affected by phosphorus levels application in both seasons. Application phosphorus at a rate of 45 kg P_2O_5/fad seemed to be the most effective treatment for increasing previous pigments in leaves compared to the other treatments in both seasons. Moreover, it can be noticed that the highest value was obtained by chicken manure and 45 kg P_2O_5/fad combination treatment. Such findings may be explained on the assumption that, P occurs in chlorophyll indicated that high pigments activity was produced and hence more photosynthetic activity was appeared. These findings are in harmony with those obtained by Mohamed (2005).

II- Numbers and abscission of flowers and pods

Data presented in Table (3) show that total number of flowers and setting pods/plant were significantly increased by chicken manure compared to farmyard manure in the two seasons. In comparison between the phosphorus levels, the data reveal that the highest increase in the number of flowers and setting pods/plant were recorded by the application at a rate of 45 kg P_2O_5/fad followed by 30 kg P_2O_5/fad. Meanwhile, the data show that the highest values of number of flowers and setting pods/plant were obtained when plants treated by chicken manure and 45 kg P_2O_5/fad treatment. This was true in both seasons.

With regard to the abscission percentage, the data in the same table refer that chicken manure significantly reduced the percentage of abscission flowers, and setting pods as well as total abscission percentage/plant compared to farmyard manure in both seasons, except flower abscission in the first season. Moreover, significant differences in, flowers, setting pods and total abscission percentage/plant were detected among the phosphorus levels. The data show that application 45 kg P_2O_5/fad inhibited this abscission compared to other phosphorus levels. Moreover, it can be noticed the lowest values of abscission were obtained by chicken manure and 45 kg P_2O_5/fad combination treatment. These results may be due to the fact that, the hormonal balance of plant in seedling stage probably changed with nutritional intensity. Thus, the promoting effect of P on enhancing flower production and decreasing the abscission of pods and this was reflected consequently on increasing the number of setting pods/plant, mainly attributed to that P element can change the cytokinin level and have a similar positive effect on photohormone content in the plant like N fertilization (Addicott, 1970).

III- Yield and yield components

Data in Table (4) represent the mean values of the yield and yield components as affected by various organic manure and mineral fertilization during 2004/2005 and 2005/2006 seasons.

Table (2) Effect of organic and mineral fertilization on photosynthetic pigments (mg/g DW.) of faba bean plant.

Organic fertilizer	Mineral fertilizer	2004/2005			2005/2006		
		Chl. a	Chl. b	Chl (a+b)	Chl. a	Chl. b	Chl (a+b)
Farmyard manure	0	5.53	2.34	7.87	5.25	2.24	7.49
	15	6.27	2.61	8.88	6.13	2.40	8.53
	30	6.49	2.81	9.30	6.40	2.76	9.16
	45	6.53	3.05	9.58	6.58	3.01	9.59
Mean		**6.21**	**2.70**	**8.91**	**6.09**	**2.60**	**8.69**
Chicken manure	0	5.77	2.41	8.18	5.42	2.35	7.77
	15	6.34	2.70	9.04	6.32	2.47	8.79
	30	6.59	2.85	9.44	6.49	2.88	9.37
	45	6.61	3.12	9.73	6.67	3.08	9.75
Mean		**6.33**	**2.77**	**9.10**	**6.23**	**2.70**	**8.92**
LSD 5%	**Organic f.**	0.09	0.05	0.13	0.11	0.08	0.20
	Mineral f.	0.32	0.26	0.29	0.53	0.34	0.67
	interaction	N.S	N.S	0.20	N.S	N.S	0.23

The data demonstrate that number and weight of pods/plant were significantly increased with chicken manure than farmyard manure in the two seasons. This may be attributed to its high nutritive value and its effect on physiochemical properties of the soil. These results are in harmony with those obtained by El-Nagar *et al.*, (2002) and El-Shafie and El-Shikha (2003). With regard to the effect of P addition on this respect, the data reveal that increasing phosphorus

levels up to 45 significantly increased number of pods/plant and consequently weight of pods/plant. This may be attributed to the important role of P on the roots growth and proliferation of plants which increase nutrients uptake and also to its role in plant metabolism, which increase nutrients absorption leading to an increase in dry matter (Mengel and Kirkby, 1987). Similar results were obtained by El-Shafie (1994), Mersal (1996) and Abou Hussien *et al.*, (2002). The interaction between the organic manure and P doses did not reach the level of significance. This was fairly true in both seasons. However, the highest values of number and weight of pods/plant were found with application chicken manure with 45 kg P_2O_5/fad. These results are agreement with those obtained by Badran *et al.*, (2000) and El- Shikha *et al.*, (2005).

Table (3): Effect of organic and mineral fertilization on Number and abscission of flowers and setting pods of faba bean plant.

Organic fertilizer	Mineral fertilizer	Number/plant		Abscission %		
		Flowers	Setting pods	Flowers	Setting pods	Total
2004/2005						
Farmyard manure	0	141.00	33.54	76.21	59.75	90.43
	15	159.25	39.25	75.35	54.65	88.82
	30	171.75	43.48	74.68	54.58	88.50
	45	179.67	46.42	74.16	53.68	88.03
Mean		**162.92**	**40.67**	**75.10**	**55.67**	**88.95**
Chicken manure	0	151.25	35.15	76.76	59.17	90.51
	15	165.08	40.29	75.59	54.08	88.79
	30	179.50	46.25	74.23	53.83	88.11
	45	184.17	48.23	73.81	53.14	87.73
Mean		**170.00**	**42.48**	**75.10**	**55.06**	**88.79**
LSD 5%	Organic f.	4.25	1.27	NS	0.32	0.12
	Mineral f.	3.21	4.26	1.03	2.37	1.56
	interaction	3.14	2.19	0.91	1.45	0.92
2005/2006						
Farmyard manure	0	149.50	35.50	76.25	59.86	90.47
	15	153.25	39.75	74.06	55.09	88.35
	30	175.08	45.08	74.25	54.30	88.23
	45	183.75	48.75	73.47	53.85	87.76
Mean		**165.40**	**42.27**	**74.51**	**55.78**	**88.70**
Chicken manure	0	157.50	36.00	74.44	59.72	90.79
	15	160.25	41.08	74.37	54.84	88.42
	30	177.08	47.08	73.41	54.97	88.03
	45	186.67	49.67	73.39	52.69	87.41
Mean		**170.38**	**43.46**	**73.90**	**55.56**	**88.66**
LSD 5%	Organic f.	3.24	1.04	0.42	0.13	0.02
	Mineral f.	4.54	5.20	0.83	2.56	1.13
	interaction	2.15	3.01	0.66	1.12	0.81

Concerning 100-seed weight, data in the same table reveal that chicken manure recorded the highest value of 100-seed weight more than farmyard manure. Similar results had been obtained by Hamati (1993) and El-Nagar *et al.*, (2002). Regarding to the effect of P levels, data illustrated that there was a significant increase in 100-seed weight with increasing phosphorus up to 45 kg P_2O_5/fad during the two

seasons. The positive effect of P on seed size might be due to its physiological role in metabolism of plant tissues. These results are agreement with those obtained by Haron and Saleh (1991) and Abo El-Soud *et al.*, (2004) who reported that the application of P caused an increase in 100-seed weight of and faba bean plants. With regard to the interaction between the organic manure and phosphorus fertilizer, it could be noted that the highest value of 100-seed weight was obtained by application chicken manure with 45 kg P_2O_5/fad during the two seasons.

Table (4): Influence of organic and mineral fertilization on yield and its components of faba bean plant.

Organic fertilizer	Mineral fertilizer	No. of pods/plant	Wt. of pods/plant	100-seed weight (g.)	Seed yield/plant (g.)	Seed yield/fad (kg.)	Straw yield/fad (kg.)
2004/2005							
Farmyard manure	0	13.5	35.70	61.30	29.50	1280.00	1735.00
	15	17.80	38.30	66.80	33.50	1365.00	1830.00
	30	19.75	45.65	68.75	36.50	1410.50	1928.00
	45	21.50	45.80	70.50	38.55	1425.00	2010.20
Mean		**18.14**	**41.36**	**66.83**	**34.51**	**1370.13**	**1875.80**
Chicken manure	0	14.35	38.50	63.30	28.80	1280.00	1815.00
	15	18.50	35.70	67.50	33.85	1360.50	1925.00
	30	21.35	47.50	75.55	37.90	1428.50	2021.00
	45	22.60	47.75	78.85	39.45	1470.50	2115.00
Mean		**19.20**	**43.36**	**71.30**	**35.00**	**1384.87**	**1969.00**
LSD 5%	Organic f.	0.61	0.90	1.35	0.36	52.05	27.50
	Mineral f.	0.57	0.83	1.23	2.67	35.15	29.30
	interaction	NS	NS	1.15	1.20	56.75	31.25
2005/2006							
Farmyard manure	0	14.25	34.50	59.85	27.40	1310.00	1815.00
	15	17.85	35.75	66.80	35.75	1327.50	1845.00
	30	20.60	46.60	69.50	37.25	1425.00	1938.00
	45	22.50	47.50	72.50	39.20	1455.00	2040.00
Mean		**18.80**	**42.08**	**67.16**	**34.90**	**1379.37**	**1909.5**
Chicken manure	0	14.50	39.50	62.70	26.50	1318.00	1845.00
	15	18.55	41.30	68.50	37.80	1388.50	1935.00
	30	21.20	48.20	77.80	38.80	1445.00	2045.00
	45	23.50	51.50	79.75	39.50	1470.00	2138.00
Mean		**19.44**	**45.13**	**72.19**	**35.65**	**1405.37**	**1990.75**
LSD 5%	Organic f.	0.67	0.92	1.42	0.78	52.10	28.75
	Mineral f.	0.61	0.81	1.31	0.71	41.00	31.50
	interaction	NS	NS	1.17	1.15	55.50	33.80

Seed yield per plant and fad were remarkably influenced by organic manure variation in both seasons. It is worth noting that, chicken manure significantly surpassed farmyard manure in this respect this was true in both seasons. Similar results were reported by Said (1998) and El-Nagar *et al.*, (2002)

Moreover, seed yield per plant and fad were significantly affected by the different levels of phosphorus application. In both seasons, application of 45 kg P_2O_5/fad significantly increased seed yield compared to the others levels. This results might be due to the increase in number and weight of pods/plant and 100-seed weight. These results are agreement with those obtained by Faiyad (1992) and Abou Hussien *et al.*, (2002). Also, data in the same table indicated that chicken manure with 45 kg P_2O_5/fad had the highest seed yield per plant and fad more than the other treatments.

The data present in Table (4) show that, straw yield/fad was increased by application chicken manure under all studied levels of phosphorus in both seasons. Phosphorus treatment at a rate of 45 kg P_2O_5/fad produced the maximum straw yield/fad followed by 30 and 15 kg P_2O_5/fad in a descending order. However, the control treatment produced the minimum straw yield/fad. These results are agreement with those obtained by Ahmed *et al.*, (2004) and Abd El-Aziz (2005). With regard to the interaction between organic manure and phosphorus levels, the highest values of straw yield/fad was produced when the plants were treated with chicken manure and 45 kg P_2O_5/fad in both seasons.

IV- Macro and Micronutrients uptake

A- Macronutrients content

Data presented in Table (5 a and b) clear that a positive effect of organic fertilizers occurred on N, P and K concentration and uptake in seed and straw of faba bean plants. Chicken manure was superior farmyard manure on macronutrients content in seed and straw of faba bean. This emphasizes the role of the chicken manure in terms of increasing the N, P and K concentration in the seed and straw via enhancing the availability of plant nutrients, which is rendered to its role in improving some physical and microbiological properties of the sandy soils. Such results came along with those reported by El-Maghraby *et al.* (1996), Badran *et al.*, (2000), Khalil *et al.*, (2000) and El-Shafie and El Shikha (2003). Regarding to the effect of P levels, data showed that there was an increase in N, P and K concentration in the seed and straw up to the highest rate i.e. 45 kg P_2O_5/fad. This may be due to that the phosphorus occurs in energy transfer reactions. This energy is then used in the photosynthetic fixation of CO_2 and the synthesis of sugars (Hewitt, 1963). These findings are in harmony with those obtained by Abou Hussien *et al.*, (2002) and El-Shikha *et al.*, (2005). The interaction among the experimental variables pointed out that, the chicken manure with 45 kg P_2O_5/fad gave the highest values of N, P and K content in the seed and straw of faba bean during the two seasons.

B- Micronutrients content

Differences among the two tested organic manure and mineral phosphorus levels in Fe, Mn, Zn and Cu content in the seed and straw of faba bean during the two seasons are shown in Table (6 a and b). Most of organic manures are bulky in nature, contain small amount of nutrients and their main value lies in the supply of organic matter to the soil. Unless applied in large amounts, they do not contributed much to the nutrient supply to plants. Nevertheless, the organic matter added in the form of manure performs certain other essential function. It promotes soil structure leading to enhanced aeration

and water holding capacity. chicken manure surpassed farmyard manure treatment on elevating the plant content of micronutrients. This may be conformed by the continuous biodegradation of chicken manure through out the growth period, providing such elements in easily absorbable forms. Also, improving the soil structure with chicken manure application encourages micronutrients availability to the growing plants. These results confirm those obtained by Eissa (1996) and El-Koumey (1999). Concerning the effect of phosphorus fertilizer levels in this concern, the same table illustrated that there was an increase in Fe, Mn, Zn and Cu content in the seed and straw of faba bean with increasing the doses of P fertilizer during the two seasons. The highest values of micronutrients uptake were recorded with application 45 kg P_2O_5/fad during the two seasons. These results are in harmony with those obtained by El-Shafie (1994) and Abou Hussien *et al.*, (2002). Moreover, application of organic manure in combination with P fertilizer levels resulted in a marked increase in micronutrients i.e. (Fe, Mn, Zn and Cu) concentrations and their uptake in seeds and straw of faba bean in the experimental treatment compared to control. This increase may be due to relatively high availability of micronutrients in the added organic manure and improving soil properties and increasing the availability uptake of these elements by plant. These findings are in harmony with those obtained by Abdel-Latif and Abdel-Fatah (1983) and Abou Hussien *et al.*, (2002).

Table (5 a): Influence of organic and mineral fertilization on macronutrients concentration and uptake in seeds of faba bean.

Organic fertilizer	Mineral fertilizer	2004/2005					
		N		P		K	
		%	mg/pl.	%	mg/pl.	%	mg/pl.
Farmyard manure	0	3.60	50.76	0.55	7.76	2.35	33.14
	15	3.85	73.92	0.62	11.90	2.60	49.92
	30	4.05	87.08	0.75	16.13	2.75	59.13
	45	4.15	96.07	0.78	18.06	2.78	64.36
Mean			**76.96**		**13.46**		**51.64**
Chicken manure	0	3.65	62.87	0.52	7.88	2.45	37.12
	15	3.90	76.05	0.65	12.18	2.70	52.65
	30	4.20	96.81	0.78	17.98	2.85	65.69
	45	4.30	104.49	0.81	19.68	2.92	70.96
Mean			**85.05**		**14.43**		**56.60**
		2005/2006					
Farmyard manure	0	3.75	53.81	0.62	8.90	2.40	34.44
	15	3.92	78.99	0.60	12.09	2.65	53.40
	30	4.15	86.26	0.78	17.04	2.72	59.43
	45	4.22	100.23	0.81	19.24	2.82	66.98
Mean			**79.82**		**14.32**		**53.56**
Chicken manure	0	3.80	61.94	0.55	8.47	2.55	41.57
	15	4.05	77.96	0.68	13.09	2.75	52.94
	30	4.20	100.17	0.79	18.84	2.88	68.65
	45	4.30	110.08	0.83	21.25	2.95	95.52
Mean			**87.53**		**15.53**		**64.68**

Table (5 b): Influence of organic and mineral fertilization on macronutrients concentration and uptake in straw of faba bean.

Organic fertilizer	Mineral fertilizer	2004/2005					
		N		P		K	
		%	mg/pl.	%	mg/pl.	%	mg/pl.
Farmyard manure	0	1.25	67.00	0.11	5.90	1.45	77.72
	15	1.45	82.21	0.13	7.37	1.58	89.59
	30	1.72	98.38	0.15	8.58	1.75	100.10
	45	1.85	117.48	0.15	9.53	1.80	114.30
Mean			**91.21**		**7.85**		**95.43**
Chicken manure	0	1.32	68.90	0.13	6.79	1.52	79.34
	15	1.60	91.68	0.16	9.17	1.65	94.55
	30	1.82	110.11	0.18	10.89	1.78	107.69
	45	2.05	133.56	0.21	13.68	1.82	118.57
Mean			**101.06**		**10.13**		**100.03**
		2005/2006					
Farmyard manure	0	1.35	71.28	0.13	6.87	1.42	74.98
	15	1.60	94.00	0.12	7.05	1.62	95.18
	30	1.85	113.87	0.15	9.23	1.85	113.78
	45	1.97	125.49	0.17	10.83	1.92	122.30
Mean			**101.14**		**8.49**		**101.56**
Chicken manure	0	1.45	80.62	0.12	6.67	1.70	94.58
	15	1.75	101.24	0.15	8.68	1.78	109.47
	30	1.92	118.08	0.17	10.46	1.85	113.78
	45	2.05	205.00	0.19	12.60	1.98	131.27
Mean			**126.35**		**9.60**		**112.26**

Table (6 a): Influence of organic and mineral fertilization on micronutrients concentration and uptake in seeds of faba bean.

Organic fertilizer	Mineral fertilizer	2004/2005							
		Fe		Mn		Zn		Cu	
		ppm	µg/pl.	ppm	µg/pl.	ppm	µg/pl.	ppm	µg/pl.
Farmyard manure	0	72.60	1147.57	48.60	685.26	41.60	586.56	5.55	77.10
	15	83.50	1603.20	55.50	1065.60	44.50	854.40	5.60	102.52
	30	88.60	1904.90	62.70	1348.05	45.60	980.40	6.30	135.45
	45	90.50	2195.08	63.20	1463.08	48.50	1048.78	6.80	152.75
Mean		**83.8**	**1687.69**	**57.50**	**1176.25**	**45.05**	**867.54**	**6.06**	**121.95**
Chicken manure	0	75.00	1136.25	52.60	796.90	38.70	686.31	5.45	82.57
	15	77.60	1520.96	58.60	1125.12	42.55	829.73	6.20	120.90
	30	87.30	2012.27	61.50	14147.75	45.75	1054.54	6.40	147.52
	45	92.50	2247.75	63.70	1547.91	51.50	1251.45	6.90	167.67
Mean		**83.10**	**1729.18**	**59.10**	**1171.92**	**44.63**	**955.50**	**6.24**	**129.66**
		2005/2006							
Farmyard manure	0	75.70	1067.37	51.20	721.92	41.50	585.15	5.30	74.73
	15	86.20	1655.04	55.90	1073.28	45.70	877.44	5.92	113.64
	30	91.50	1967.25	63.50	1365.25	47.50	1021.25	6.75	145.13
	45	102.0	2361.30	65.80	1523.27	47.30	1094.99	7.20	169.20
Mean		**88.85**	**1762.74**	**59.10**	**1170.93**	**45.50**	**894.70**	**6.29**	**125.68**
Chicken manure	0	81.50	1234.25	48.70	686.67	38.70	586.31	5.40	81.81
	15	88.35	1722.83	55.90	1090.05	43.60	850.20	6.13	119.93
	30	96.70	2221.94	62.50	1440.25	47.20	1087.96	6.82	157.20
	45	105.7	2568.51	62.80	1526.04	52.20	1268.46	7.35	178.61
Mean		**93.06**	**1938.63**	**57.47**	**1187.00**	**45.43**	**948.23**	**6.43**	**134.38**

Table (6 b): Influence of organic and mineral fertilization on micronutrients concentration and uptake in straw of faba bean.

Organic fertilizer	Mineral fertilizer	2004/2005							
		Fe		Mn		Zn		Cu	
		ppm	µg/pl.	ppm	µg/pl.	ppm	µg/pl.	ppm	µg/pl.
Farmyard manure	0	123.50	6619.60	92.50	4979.44	56.30	3017.68	6.06	324.28
	15	131.70	7467.39	98.60	5590.62	67.30	3815.91	6.40	362.88
	30	138.40	7916.48	103.80	5937.36	71.50	4089.80	6.75	386.10
	45	146.60	9309.10	111.50	7080.25	75.00	4762.50	7.15	454.03
Mean		**134.63**	**7828.14**	**101.62**	**5896.91**	**67.55**	**3921.47**	**6.69**	**381.82**
Chicken manure	0	117.60	6209.28	85.50	4514.40	57.30	3025.44	5.95	314.16
	15	128.50	7549.37	97.80	5745.75	68.30	4012.62	6.55	371.71
	30	142.30	8751.45	105.50	6488.25	75.60	4649.40	6.25	384.37
	45	155.50	9905.35	117.30	7472.01	78.30	4987.71	7.25	461.82
Mean		**135.95**	**8103.86**	**101.53**	**6055.10**	**69.87**	**4168.79**	**6.65**	**383.01**
		2005/2006							
Farmyard manure	0	117.00	6177.60	95.60	2407.68	48.50	2560.80	5.75	303.60
	15	135.80	7978.25	92.30	5422.63	68.05	3997.93	6.15	361.31
	30	139.60	8585.40	106.20	6531.30	75.30	4630.95	6.75	415.12
	45	148.50	9459.45	114.30	7280.91	78.50	5000.45	7.25	461.82
Mean		**115.18**	**8050.17**	**102.10**	**5410.62**	**67.18**	**4047.53**	**6.55**	**385.46**
Chicken manure	0	123.50	6866.60	83.50	4642.60	62.20	3736.32	6.75	375.30
	15	138.50	8012.23	100.05	5787.89	71.50	4136.27	6.30	393.50
	30	141.70	8714.55	112.30	6906.45	77.60	4772.40	7.15	432.57
	45	143.80	9533.94	117.00	7757.10	79.30	4926.09	7.30	483.99
Mean		**136.85**	**8281.83**	**103.21**	**6273.51**	**72.65**	**4392.77**	**6.88**	**421.34**

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تأثير التسميد العضوي والمعدني على صبغات التمثيل الضوئي والإزهار ومحصول الفول البلدي ومكوناته ومحتواه من بعض العناصر المغذية.

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جريت تجربتان حقليتان فى محطة البحوث الزراعية - جنوب التحرير- مركز البحوث الزراعية- قرية على مبارك منطقة البستان - محافظه البحيرة وذلك خلال الموسمين ٢٠٠٤/٢٠٠٥ ، ٢٠٠٥/ ٢٠٠٦ لإلقاء الضوء على مدى تأثير اضافة السماد العضوي (سماد المزرعة ، سماد الدواجن) مع معدلات من التسميد الفوسفاتي (٠ ، ١٥ ، ٣٠ ، ٤٥ كجم فو٢أه/فدان) والتفاعل بينهما على محصول الفول البلدي.
وقد أسفرت أهم نتائج الدراسة عن ما يلى:

١- لوحظ وجود اختلافات معنوية بين نوعى السماد العضوي فى كل الصفات المدروسة خلال موسمي الزراعة. حيث أدى استخدام سماد الدواجن إلى زيادة معنوية فى الكلوروفيل ، عدد الأزهار والقرون العاقدة للنبات ، وزن ١٠٠ بذرة ، محصول البذور للنبات وكذلك محصول البذور والقش بالفدان ولكن كان هناك انخفاضا معنويا فى معدل تساقط الأزهار والقرون والتساقط الكلى.

٢- أظهرت مستويات التسميد الفوسفاتي اختلافات معنوية فى الصفات المدروسة حيث سجل المعدل ٤٥ كجم فو٢أه/فدان أعلى قيم الكلوروفيل ، عدد الأزهار والقرون العاقدة للنبات ، وزن ١٠٠ بذرة وكذلك صفات مكونات محصول الفول البلدى في حين انخفض معنويا معدل تساقط الأزهار والقرون والتساقط الكلى.

٣- أدى استخدام سماد الدواجن إلي تحسين امتصاص ونسبة المغذيات الكبرى (النيتروجين ، الفوسفور ، البوتاسيوم) والصغرى (حديد ، منجنيز ، زنك ، نحاس) فى بذور وقش نباتات الفول البلدى مقارنة بسماد المزرعة خلال موسمي الدراسة.

٤- سجلت أعلى قيم المغذيات الكبرى والصغرى الممتصة بواسطة بذور وقش نباتات الفول البلدى باستخدام التسميد الفوسفاتي بمعدل ٤٥ كجم فو٢أه/فدان.

أظهر التفاعل بين سماد الدواجن ومعدل التسميد الفوسفاتي ٤٥ كجم فو٢أه/فدن أفضل نتائج الكلوروفيل والتزهير والعقد والمحصول ومكوناته وكذلك محتوى البذور والقش من المغذيات الكبرى والصغرى.