Effect of Organic Manure and Nitrogen Fertilizer on Growth, Yield and Yield Components of Faba Bean Grown Under Toshka Condition

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Abstract:

The coincident application of organic fertilizer is frequently recommended firstly for improving biological, physical and chemical properties of soil and secondly to get clean agricultural products free of macro chemical fertilizers. Two field experiments were conducted at the Agricultural Research Center, South Valley Agricultural Research Station (Toshka), Aswan Governorate, Egypt. These experiments were conducted during the two successive winter seasons to investigate the addition of filter mud cake (zero, 10 and 20 m^3/fad) associated with zero, 15, 30 or 45 Kg N /fad on growth characters, yield and yield components of faba bean plants grown on Toshka soils The results indicated that the addition of filter mud cake(FMC), as an organic manure had significant effects on number of branches/plant, plant height ,number of pods / plant, seed yield (kg/fad) , straw yield (kg/fad) , biological yield (kg/fad) and 100-seed weight. The highest values were recorded by using 20 m^3 FMC/ fad. Also increasing nitrogen fertilization levels from zero to 45 kg N/fad gave the highest values of growth characters, yield and its components and NPK contents in seeds and straw as well as NPK uptake. The combination of 30 kg N / fad associated with 20 m^3 FMC/ fad could be applied to get high quantity and quality of faba bean yield cultivated under Toshka condition.

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Introduction:

Faba bean (Vicia faba L.) is considered one of the most important legume crops in Egypt. It is used for human consumption as a good source of vegetarian protein. The cultivated area of faba bean in 2005 reached 198,000 faddan. This area gives total production of 1.82 million ardab. It is very important to increase the productivity of unit area of faba bean to face the increasing demand by using different agricultural practices i.e. high yielding varieties, and the proper agricultural practices.

Using organic manure resulted in improveing the chemical and physical properties of the soil; reducing pH, EC , increasing soil organic matter content and nutrient supply for growing plants (Mahmoud *at. al.* , 2004). Numerous studies have been carried out to investigate the effect of different organic manures on growth and yield of faba bean crop.

For an optional yield, the N supply must be available according to the needs of the plant. Nitrogen deficiency generally resulted in stunned growth and chlorotic leaves. The presence of N in excess results in abundant dark green (high chlorophyll). This increase the risk of loding and reduce the plant resistance to harsh climatic conditions and to folio diseases (Lincoln,2006).

Biological nitrogen fixation has often been reported insufficient due to many studies (Vikman and Vessey, 1993). This raises the question whether we should apply nitrogen fertilizers in addition to symbiotic nitrogen fixation to the crop to meet the need for potential crop production or not? Many studies showed a beneficial effect of ammonium nitrate on the seed yield of faba bean (Pizto *et al.,* 1991)

Materials and Methods:

Two field experiments were conducted at the Agricultural Research Station Farm of the South Valley Research Station (Toshka), Aswan during the two successive winter seasons of 2010-2011 and 2011-2012. This work aims to study the effect of organic manure (filter mud cake) and nitrogen fertilizer on growth, yield and yield components of faba bean(cv Msar-1) under drip irrigation system. Some physical and chemical properties of the experimental soil sample collected before planting of faba bean plant are presented in Table(1). The used organic filter mud cake is produced in huge quantities, at Edfo sugar cane factory and used as organic manure. The chemical composition of the filter mud cake is presented in Table (2)

Randomized complete block design in split- plot arrangement with three replicates was used. The organic manure (filter mud cake) treatments were randomly distributed in the main plots and nitrogen fertilizer treatments were assigned in the subplots.. Each plot consisted of 4 ridges (2.5 m long and one- meter width). Analysis of variance was done for the data of each season separately and combined analysis of variance for the two seasons was conducted testing the error homogeneity according to (Gomez and Gomez 1984) where the F-test showed significant differences among means. Least Significant Differences (LSD) test was performed at the 0.05 level of probability to separate means

The materials used in this investigation were as follows:

A) Organic manure (filter mud cake):

1- Without (FMC).

2- 10 m^3 organic manure (FMC)/fad.

3- 20 m^3 organic manure (FMC)/fad.

B) Nitrogen fertilizer:

1- 0.0 kg N//fad
2- 15 kg N/fad
3- 30 kg N/fad
4- 45 kg N/fad

Data Collected:

A) Growth parameters:

Five guarded plants as a sample were chosen randomly from the fourth row of each plot after 70 days from planting in both seasons and labeled during the growing season. The following parameters were determined

1.Number of branches / plant
2. Plant height (cm).

B) Yield and its components:

At harvest (150 days from sowing), a random sample of ten plants were taken from each plot to determine the number of pods /plant, and 100-seed weight. Plants on the middle two rows were harvested and their pods were air dried to estimated seed, straw and biological yields/fad.

C) Chemical analysis:

N, P and K content (%) and total and uptake by plant were determined.

Methods of soil analysis:

Particle size distribution: was determined using the pipette method (Jackson,1973) .

Total soluble salts: as EC were determined in (1:2.5) soil – water extract using conductivity meter according to (Jackson,1973).

Soil reaction (pH): was measured in (1:2.5) soil – water suspension using Beckman pH meter as reported by (Page *et al.*,1982).

Total calcium carbonate: was determined using Scheibier calcimeter (Jackson,1973).

Total N: was determined according to (Page *et al.*,1982).

Available P: was extracted by (0.5 M Na HCO_3 at pH 8.5)the extracted P was measured spectrophotometrically using stannous chloride phosphomolybdic acid system as describe by (Jackson,1973).

Total soluble ions: was determined in water extract of soil past (Jackson,1973).

- **Soluble cations:** soluble Ca and Mg were determined by titration with versene solution while soluble Na and K were determined by flame photometer (Jackson,1973).
- **Soluble anions:** carbonate and bicarbonate were determined by titration with 0.01 N H_2SO_4, Cl was determined by titration with silver nitrate soluation (Jackson,1973),while sulphate was calculated by difference between soluble cations and anions .

Methods of plant analysis:

Half gram of ground plant faba bean was digested in 10 ml of H_2SO_4 and 2 ml perchloric acid in a conical flask as described by (Chapman and Pratt, 1978) . The digested samples were distilled using micro- kjeldahl method and nitrogen content was determined according to (Page *et al.*,1982).

Total N: was determined following the micro-kjeldahl method as described by (Jackson,1973).

Total P: was determined spectrophotometrically using the chorostannus-phosphomolybdic acid method in a sulfuric acid system (Jackson,1973).

Total K: was determined using the flame photometer method described by (Page *et al.*,1982).

Statistical Analysis:

Statistical analysis was done for the data of variance of each season separately and combined analysis of variance for the two seasons was conducted testing the error homogeneity according to (Gomez and Gomez 1984). The F-test showed significant differences among means, Least Significant Differences (LSD) test was performed at the 0.05 level of probability to separate means.

Table (1): Some physical and chemical properties of the experimental soil

Properties	Values	Properties	Values	Properties	Values
Soluble cations and anions (meq/100 g soil):		**Chemical analysis**		**Mechanical analysis (fraction,%):**	
Ca^{+2}	0.38				
Mg^{+2}	0.16	Total CaCO3 %	5.25	Clay	13.3
Na^{+}	0.30	EC ds/m-1 (1:2.5)	0.93		
K^{+}	0.13	pH(1:2.5suspension)	8.07	Silt	18.1
CO_3--	0.00	Organic matter %	0.07		
HCO_3^{-}	0.24	Total N (ppm)	192	Sand	68.6
Cl-	0.25	Available P (ppm)	2.7		
SO_4^{--}	0.48	Total K (ppm)	246	Texture grade	Sandy loam

* *Laboratories unit in Toshka [lab.(ARC)]*

Table (2): Some chemical analysis of the filter mud cake.

Properties	Values	Properties	Values
PH	6.2	Total Ca	2.70%
OM	79.5 %	Total Mg	0.39%
Total N	2.52 %	Total Fe	500 ppm
Total P	2.1%	Total Mn	310 ppm
Total K	0.66%	Total Zn	123 ppm
C/N ratio	18.30	Total Cu	185 ppm

* *Laboratories unit in Toshka [lab.(ARC)]*

Results and Discussions:

A- Growth Characters:

Data in Table (3) summarized the main combined effect of application of filter mud cake (FMC) and nitrogen fertilization on growth characters, yield and yield components of faba bean plants during the two seasons

Results in Table (3) indicated that the addition of filter mud cake, as an organic manure had significant effects on number of branches / plant, plant height and number of pods / plant. highe values of studied growth characters were recorded in plants fertilized with filter mud cake compared to control treatment. The highest percentage increase in number of pods / plant (23%) was found in plants amended with 20 m^3/fad of filter mud cake. These results are in accordance with those found by El-Zawahry (2000).

Growth traits including number of branches / plant, number of pods / plant and plant height ware significantly affected by increasing the level of nitrogen fertilization companed to the control treatment (Table 3).

The greatest values of these growth characters were recorded in plants fertilized with 45 kg N/fad. these increases may be attributed to the effect of nitrogen on the metabolic processes and physiological activities of meristematic tissues, which are responsible for cell division and

elongation in addition to formation of plant organs .These findings are in agreement with those reported by Sobkowicz and Parylak, (2002) ; Botos *et. al.* (2009) ; El-Aal (2010).

B-Yield and its components:

Data in Table (3) illustrated that filter mud cake addition had significant effects on faba bean yield and its components Application of $20m^3$of FMC/fad caused increases in seed yield, straw yield and biological yield amounted to 15.5%, 24.1% and 20.5% respectively. These results are in agreement with those found by Helall *et al.* (2009).

Also, data in Table (3) indicated that the mean values of straw yield, biological yield and seed yield were significantly affected by increasing the rate of nitrogen fertilizer from zero to 45 kg N/fad. These increases amounted to 37.1%, 39.7% and 43.8% respectively. These increases in yield and it components could be attributed as the fact that the nitrogen fertilizer was the only source of nitrogen to meet the plant requirement for nitrogen element. It was observed that addition of 30 kg N/fed produced the highest and significant increase in seed yield in comparison to the control treatment. This increase went up to 53.2% of the control. Similar results were early reported by El-Khawaga and Zeiton (1986); Diaz and Manrique (1995); Labuda (2001); Daur *et. al* (2008) ; Botos *et. al.* (2009).

Table (3): The main combined effect of application of filter mud cake (FMC) and N fertilizer on growth characters, yield and yield components of faba bean plants during the two growing seasons.

Treatments	Number of branches /plant	Number of pods/plant	Plant height cm	Weight of 100_seed g	Seeds yield kg/f	Straw yield kg/f	Biological yield kg/f
00 m^3FMC /fad	3.18	14.55	95.5	74.48	1085.8	1495.5	2581.2
10 m^3FMC /fad	3.24	16.89	97.8	75.22	1226.4	1761.6	2988.0
20 m^3FMC /fad	3.27	17.90	98.9	75.62	1254.4	1855.3	3109.6
LSD at 5%	**0.03**	**0.48**	**0.9**	**0.24**	**49.3**	**92.2**	**114.8**
00kg N/fad	3.11	15.00	93.3	74.41	899.0	1447.8	2346.8
15kg N/fad	3.20	15.64	96.8	74.96	1186.3	1610.2	2796.4
30kg N/fad	3.29	17.47	99.1	75.29	1377.1	1773.8	3151.0
45kg N/fad	3.33	17.70	100.5	75.75	1292.9	1984.7	3277.6
LSD at 5%	**0.03**	**0.58**	**1.2**	**0.18**	**49.4**	**48.0**	**70.2**

Data in Table (4) showed the interaction effect between the application of filter mud cake (FMC) and nitrogen fertilizer on seed , straw , biological yields and 100- seed weight. Results in Table (4) indicated that numbers of branches /plant as well as plant height were not significantly affected by the above interaction. Similar results went on the effect on straw yield. On the other hand, the interaction effect between FMC and nitrogen fertilization on number of pods /plant, seed yield, biological yield and 100-seed weight was significant. So the interaction effect was non significant on straw yield. Application of nitrogen fertil-

izer at 30 kg N/fad and 20m^3 /fad of FMC produced the highest values of seed yield (1535.3 kg/fad) and biological yield (3466.0 kg/fad) previous seed yield at the treatment combination surpassed significantly the seed yield of other treatments. The interpretation for these results could be attributed to the fact that both nitrogen fertilization and FMC supplied the plants with adequate and enough quanties of their requirements for nitrogen. Once nitrogen was found in suitable amounts in soil, that could push the plant to grow vigorously lead to an increase vegetative growth and then seed yield.

Table (4): The interaction effect between of application of filter mud cake (FMC) and N fertilizers on growth characters, yield and yield component of faba bean plants during the two growing seasons .

Treatments	Number of branches /plant	Number of pods/plant	Plant height cm	Weight of 100_seed g	Seeds yield kg/f	Straw yield kg/f	Biological yield kg/f
00 m^{3}FMC /fad & 00kg N/fad	3.06	12.48	89.8	73.52	833.3	1240.7	2074.0
00 m^{3}FMC /fad & 15kg N/fad	3.15	13.02	95.2	74.23	1014.8	1397.8	2412.7
00 m^{3}FMC /fad & 30kg N/fad	3.23	16.35	97.3	74.75	1149.0	1572.0	2721.0
00 m^{3}FMC /fad & 45kg N/fad	3.28	16.37	99.8	75.42	1345.9	1771.3	3117.3
10 m^{3}FMC /fad & 00kg N/fad	3.13	15.17	94.2	74.69	958.4	1542.3	2500.7
10 m^{3}FMC /fad & 15kg N/fad	3.21	16.54	97.2	75.12	1187.8	1665.3	2853.1
10 m^{3}FMC /fad & 30kg N/fad	3.29	17.67	99.3	75.35	1447.1	1818.8	3266.0
10 m^{3}FMC /fad & 45kg N/fad	3.32	18.20	100.7	75.71	1312.3	2019.8	3332.1
20 m^{3}FMC /fad & 00kg N/fad	3.15	17.33	95.8	75.03	905.3	1560.3	2465.6
20 m^{3}FMC /fad & 15kg N/fed	3.23	17.35	98.0	75.53	1356.3	1767.3	3123.6
20 m^{3}FMC /fad & 30kg N/fad	3.33	18.38	100.7	75.77	1535.3	1930.7	3466.0
20 m^{3}FMC /fad & 45kg N/fad	3.38	18.55	101.0	76.13	1220.6	2162.8	3383.4
LSD at 5%	**N.S.**	**0.99**	**N.S.**	**0.36**	**89.0**	**N.S.**	**155.7**

C- Chemical Traits:

Protein percentages and NPK concentrations in seeds and straw and seeds:

Data in Table (5) summarized the main effects of application and nitrogen fertilizer rates on percentages of NPK in seeds, straw as well as protein percent in seeds of faba bean plants. Table (5) show that N%, P% and K% as well as seed protein percent were increased as the rate of FMC application was increased. However these increases were not significant except P% in straw. The greatest increases in these traits were recorded in treatment received 20 m^3/fad of FMC compared with the other treatments including control treatment. These findings are in agreement with those found by Attia and El-Dsouky(2001) ; Abd-Allah, (2002).

Also data in Table (5) showed that both N% and P% in seeds were significantly increased with increasing N rates in comparison to the control. Addition of nitrogen fertilizer at a rate of 45 kg N/f recorded the highest significant increases in N as well as P in seeds and protein. It was noticed that K% either in seeds or in straw recorded the greatest values when 15 kg N/fan was applied. The increases were significant when compared to the control. These results are in agreement with those recorded by Adam (2002) ; Botos *et. al.* (2009).

Table (5): The combined effect of filter mud cake (FMC) application and N fertilizers on N, P and K percentages in seed and straw of faba bean as well as protein (%) in seeds during the two growing seasons.

Treatment	Seed			Straw			
	N %	P %	K %	N %	P %	K %	Protein % seed
00 m^3FMC /fad	2.34	0.22	1.97	1.37	0.12	0.51	14.64
10 m^3FMC /fad	2.46	0.23	2.07	1.38	0.13	0.54	15.38
20 m^3FMC /fad	2.55	0.24	2.10	1.39	0.13	0.54	15.96
LSD at 5%	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**0.01**	**N.S.**	**N.S.**
00kg N/fad	1.33	0.20	2.05	1.42	0.118	0.53	8.28
15kg N/fad	1.89	0.22	2.11	1.44	0.121	0.55	11.78
30kg N/fad	2.77	0.24	2.04	1.32	0.126	0.53	17.30
45kg N/fad	3.83	0.25	1.98	1.33	0.132	0.51	23.93
LSD at 5%	**0.21**	**0.01**	**0.03**	**0.06**	**0.003**	**0.01**	**1.29**

The interaction effect between the addition of filter mud cake and nitrogen fertilization rates is shown in Table (6). In general, N% and P% in seeds as well as in straw were not significantly affected by the above interaction effect. On the other hand the above interaction effect on K% in seeds and in straw was significant (Table 6). Although the interaction effect of nitrogen fertilization and FMC on protein percentages in seeds was not significant. However, the addition of 20 m^3 /fad of FMC and 45 kg N/fad recorded the highest value of protein percentage. This could be referred to the fact that the greatest value of N% was found in seeds under the same treatment.

Table (6): The interaction effect between of application of filter mud cake (FMC) and N fertilizers on N, P and K percentages in seed and straw of faba bean as well as protein (%) in seeds during the two growing seasons

Treatment	Seed			Straw			
	N %	P %	K %	N %	P %	K %	Protein % seed
00 m^3FMC /fad & 00kg N/fad	1.25	0.20	1.85	1.37	0.11	0.48	7.83
00 m^3FMC /fad & 15kg N/fad	1.74	0.21	1.99	1.45	0.11	0.52	10.88
00 m^3FMC /fad & 30kg N/fad	2.62	0.23	2.04	1.35	0.12	0.53	16.40
00 m^3FMC /fad & 45kg N/fad	3.76	0.24	1.98	1.31	0.12	0.51	23.47
10 m^3FMC /fad & 00kg N/fad	1.32	0.21	2.21	1.42	0.12	0.57	8.24
10 m^3FMC /fad & 15kg N/fad	1.91	0.22	2.12	1.44	0.13	0.55	11.93
10 m^3FMC /fad & 30kg N/fad	2.82	0.24	1.96	1.31	0.13	0.51	17.63
10 m^3FMC /fad & 45kg N/fad	3.80	0.25	2.00	1.34	0.14	0.52	23.72
20 m^3FMC /fad & 00kg N/fad	1.41	0.21	2.09	1.47	0.12	0.54	8.78
20 m^3FMC /fad & 15kg N/fed	2.01	0.23	2.23	1.43	0.13	0.58	12.55
20 m^3FMC /fad & 30kg N/fad	2.86	0.25	2.11	1.31	0.13	0.55	17.89
20 m^3FMC /fad & 45kg N/fad	3.94	0.26	1.96	1.34	0.14	0.51	24.60
LSD at 5%	**N.S.**	**N.S.**	**0.36**	**N.S.**	**N.S.**	**0.07**	**N.S.**

D- NPK Uptake:

Effect of filter mud cake and nitrogen fertilization on uptake of N, P and K by faba bean plants.

Data in Table (7) showed the effect of FMC application and nitrogen fertilization on the uptake of N, P and K. Data indicated that addition of 10 or 20 m^3 FMC/fad resulted in significant increases in the uptake of the three nutrients by faba bean plants in comparison to the control treatment. Increasing FMC rates from 10 to 20 m^3/fad did not significantly affect the total uptake of the three nutrients by faba bean plants. Data also showed that N uptake exhibited the greatest values followed by uptake of K and P. The highest values of uptake for the three elements was found in seeds in comparison to those found in straw.

Increasing rates of nitrogen fertilizer from 15 to 45 kg N/fad significantly increased total uptake of N, P and K by faba bean plants when compared to the control treatment (Table 7). The application of 15, 30 and 45 kg N/fad led to increases in total N uptake up to 40.7, 90.1 and 133.5% respectively compared to the control. In addition to P and K uptakes increased by (26.3, 58.5 and 69.5%) and (40.2, 41.7 and 35.1%) respectively under the same treatments of N fertilization. The greatest value of N uptake was found in treatment fertilized by 45 kg N/fad (75.78 kg/fad). These results are in agreement with those found by Sobkowicz and Sniady (2004). On the other hand the greatest value of K uptake was recorded in the treatment 30 kg N/f. Again uptake of N and K by faba bean plants were much greater than P.

Table (7): The combined effect of application of filter mud cake (FMC) and N fertilizers on NPK uptake (kg/fed) of faba bean the during the two growing seasons.

Treatment	N uptake(kg /fed)			P uptake (kg /fed)			K uptake (kg /fed)		
	Seeds	Straw	Total	Seeds	Straw	Total	Seeds	Straw	Total
0 org. m^3/fed	27.21	20.35	47.56	2.39	1.73	4.18	21.43	7.66	29.08
10 org. m^3/fed	31.48	24.14	55.61	2.82	2.26	5.08	25.23	9.41	34.64
20 org. m^3/fed	32.95	25.57	58.52	3.01	2.42	5.52	26.38	10.05	36.42
LSD 5%	**6.87**	**2.99**	**5.08**	**0.29**	**0.14**	**0.49**	**4.58**	**1.07**	**5.29**
00kg N/fed	11.84	20.61	32.45	1.83	1.71	3.57	18.65	7.76	26.41
15kg N/fed	22.52	23.14	45.66	2.57	1.96	4.51	25.18	8.85	34.03
30kg N/fed	38.38	23.32	61.70	3.30	2.25	5.56	28.03	9.39	37.42
45kg N/fed	49.44	26.34	75.78	3.26	2.63	6.05	25.52	10.16	35.68
LSD at 5%	**3.19**	**1.31**	**3.24**	**0.15**	**0.08**	**0.22**	**0.95**	**0.29**	**1.00**

The interaction effect between FMC and nitrogen fertilization on the uptake of N, P and k by faba bean plants is shown in Table(8).

Data showed that the application of 45 kg N/fad alongside 0, 10 and 20 m^3 FMC/fad gave significant increases in total N uptake by faba bean plants compared with treatment received no FMC or nitrogen fertilizer. Application of 45 kg N/fad alongside with 0, 10 and 20 m^3/fad organic manure caused increases by 168.9, 180.7 and 181,5% over zero

organic and zero N kg/fed. Total uptake of potassium by faba bean plants was also affected significantly by the interaction between mineral and organic fertilization. On the other hand, total phosphorus uptake was not significantly affected by the interaction between the two factors under investigation.

Table (8): The interaction of combined effect between of application of filter mud cake (FMC) and N fertilizers on NPK uptake (kg/fad) of faba bean during the two growing seasons.

Treatment	N up take kg /fed			P up take kg /fed			K up take kg /fed		
	Seeds	Straw	Total	Seeds	Straw	Total	seeds	Straw	Total
00 m^3FMC /fad & 00kg N/fad	10.39	16.97	27.35	1.62	1.36	3.05	15.50	5.96	21.47
00 m^3FMC /fad & 15kg N/fad	17.70	20.20	37.89	2.09	1.56	3.65	20.16	7.22	27.37
00 m^3FMC /fad & 30kg N/fad	30.33	21.11	51.44	2.58	1.83	4.43	23.42	8.35	31.77
00 m^3FMC /fad & 45kg N/fad	50.42	23.14	73.55	3.28	2.18	5.57	26.63	9.10	35.73
10 m^3FMC /fad & 00kg N/fad	12.52	21.88	34.40	1.98	1.90	3.86	21.39	8.84	30.22
10 m^3FMC /fad & 15kg N/fad	22.67	23.98	46.65	2.55	2.08	4.58	25.17	9.14	34.31
10 m^3FMC /fad & 30kg N/fad	40.94	23.67	64.61	3.43	2.34	5.72	28.23	9.24	37.47
10 m^3FMC /fad & 45kg N/fad	49.78	27.01	76.79	3.32	2.72	6.15	26.14	10.43	36.58
20 m^3FMC /fad & 00kg N/fad	12.60	22.98	35.58	1.89	1.87	3.81	19.06	8.48	27.53
20 m^3FMC /fad & 15kg N/fed	27.19	25.23	52.43	3.07	2.24	5.30	30.22	10.19	40.40
20 m^3FMC /fad & 30kg N/fad	43.86	25.18	69.04	3.89	2.57	6.54	32.44	10.57	43.01
20 m^3FMC /fad & 45kg N/fad	48.13	28.88	77.01	3.18	2.99	6.44	23.79	10.95	34.74
LSD at 5%	**8.37**	**N.S.**	**7.03**	**0.36**	**N.S.**	**N.S.**	**4.80**	**1.16**	**5.50**

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تأثير السماد العضوي والآزوتي على النمو والحاصل ومكوناته للفول البلدي تحت ظروف توشكي

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الملخص:

أجريت هذه الدراسة في مزرعة محطة البحوث الزراعية جنوب الوادي (توشكى) مركز البحوث الزراعية بمدينة ابوسمبل السياحية ، محافظة أسوان ، مصر خلال موسمي الشتاء ٢٠١٠-٢٠١١ و٢٠١١-٢٠١٢ بهدف دراسة تاثير إضافة السماد العضوي (طينة المرشحات) بمعدلات(صفر و ١٠ و ٢٠ م^3 /فدان) والتسميد الازوتي بمعدلات (صفر ، ١٥، ٣٠ و ٤٥ كجم نيتروجين/ فدان) على صفات النمو والحاصل و مكوناته لنباتات الفول البلدى المنزرع تحت ظروف توشكى . أشارت النتائج إلى أن إضافة طينة المرشحات كسماد عضوي كان له تأثير كبير على عدد التفرع و طول النبات و عدد القرون ووزن حاصل البذور و وزن التبن و وزن الحاصل البيولوجي و وزن ١٠٠ بذرة ، حيث اعلي قيم سجلتها تمت باستخدام المعاملة ٢٠ م^3/ فدان. وأيضا زيادة مستويات التسميد النيتروجيني من صفر إلى ٤٥ كجم نيتروجين /فدان أعطى أعلى قيم لصفات النمو والحاصل و مكوناته ونسبة النتروجين والقوسفور والبوتاسيوم الممتص في كل من البذور و التبن. توصي الدراسة للحصول على اعلى حاصل من الفول واعلى جودة في اراضي توشكى عند استخدام ٣٠ كجم نيتروجين / فدان مع ٢٠ م^3/ فدان من طينة المرشحات.