Annals Agric. Sci., Ain Shams Univ., Cairo, 50(1), 135-146, 2005

FORAGE YIELD AND NUTRITIVE VALUE OF MUNGBEAN (*VIGNA RADIATA* (L.) WILEZEK) AS AFFECTED BY BIO AND MENIRAL FERTILIZATION UNDER MARIOUT REGION CONDITIONS

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ABSTRACT

The study reported herein was conducted in Mariout Research Station of Desert Research Center throughout 2002 and 2003 summer seasons. The experiments were carried out to study the effect of different levels of phosphorus i.e. 0, 15, 30 and 45 Kg P_2O_5/fed. as well as three sources of bio-fertilizer viz. *Rhizobium, Bacillus megatherium* and their mixture on growth, forage yield, seed yield and chemical composition of mungbean plants. The results obtained can be summarized as follows:

1- All growth characters investigated i.e. plant height, number of branches per plant, leaf area and specific leaf weight were clearly increased with increasing phosphorus levels up to 45 Kg P_2O_5/fed..
2- The highest fresh and dry forage yields were obtained by using 45 Kg P_2O_5/fed. and when mungbean seeds were inoculated with *Bacillus megatherium* (phosphate dissolver).
3- Increasing phosphorus levels from 0 to 45 Kg P_2O_5/fed. resulted in significant increase in mungbean seed yield and its attributes. In addition, inoculation mungbean seeds with phosphate dissolving bacteria (*Bacillus megatherium*) gave the highest values of mungbean seed yield and its contributing characters.
4- Alhough both of crude protein and ash content of mungbean plants did not significantly affected by increasing phosphorus levels, crude fiber content was significantly decreased from 16.01 to 14.55 %. Different bio-fertilizer resources used in this study had no significant effect on crude protein and ash percentages. Whereas using *Bacillus megatherium* led to significant increase in crude fiber percent.

Key words: Mungbean, *Vigna radiate*, Bio-fertilizer, Phosphorus, Forage yield

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(Received February 27, 2005)
(Accepted March 16, 2005)

INTRODUCTION

Pasture legumes have a relatively high protein content compared with other forage crops. They play an important role in livestock nutrition and are a good precedent for cereals. They increase the soil fertility by both organic matter and biological nitrogen fixation **(Bouaziz and Ben Salah, 1998)**. The value of including forage legumes in the crop rotations in the dry areas is well studied. It has been estimated that pasture legumes add 30 to 160 Kg N/ha to the soil each year and may fix a total of 150 Kg N/ha **(Puckridage and French, 1983)**.

In Egypt mungbean or greengram (*Vigna radiata* (L.) Wilckzek) is considered as untraditional field crop recently introduced from India and Pakisan in 1986 **(Ashour *et al* 1993)**. Although mungbean is an important annual pulse crop in human nutrition, the availability of under-sized, split or excess beans during periods of overproduction has stimulated interest in the use of these beans as animal feed. Also, its herbage (forage material) can be used as hay, silage and pasture **(Martin *et al* 1976)** and they can be feed to many livestock species **(Ligon, 1945)** throughout summer period specially under Egyptian conditions. Growth criteria, chemical content consequently forage and seed yields of mungbean may be affected by many agronomic practices among which phosphatic and bio fertilization. In field trials *Vigna radiata* was sown and given 0, 30 or 60 Kg P_2O_5/ha, application of 60 Kg P_2O_5 gave the highest growth rates and DM production **(Tomar *et al* 1995)**. Also, **Srimathi and Jerlin (1997)** studied the effects of 0, 50 100 Kg P/ha on seed quality of cowpea and stated that seed weight was increased by P application. **Mohapatra *et al* (1996)** found that seed yield of *Vigna mungo* was increased with P_2O_5 up to 40 Kg /ha. Moreover, seed yield of green gram was increased with increasing P_2O_5 level up to 40 Kg/ha **(Shukla and Dixrr 1996, Saxena *et al* 1996)** and they also pointed out that seed yield was positively correlated with leaf area and DM/plant. Furthermore, application of 40 Kg P_2O_5/ha resulted in a 2, 15 and 17% increase in seed, stover and total yield of *Phaseolus mungo*, respectively **(Nepalia *et al* 1996)**. The effect of various levels of phosphorus on growth, yield attributes and yield of greengram was studied by many investigators among whom **Sharma and Room, 1997; Tomar *et al* 1996; Abdel-Ati, 2000; Mandal and Sikder, 1999 and Chowdhury *et al* 2000**. They concluded that application of phosphorus enhanced plant height, branches, pods/plant, harvest index, 1000 grain weight and grain and straw yields.

A symbiotic relationship exists between mungbean plant and soil rhizobia of the cowpea-type or cross-inoculation group. **Shukla and Dixrr (1996)** revealed that seed inoculation with *Rhizobium* significantly increased seed yield of greengram plants. In field trial conducted by **Naidu and Hanuman (1996)** *Vigna radiata* seeds were inoculated with 2 strains of *Rhizobium* viz USDA-3463 and M_4. They found that seed yield and protein content were highest with seed inoculation with USDA-3463. **Patra and Bhattacharyya (1997)** inoculated *Vigna radiata* seeds with *Rhizobium* and/or given 25 Kg urea/ha. They noticed that all treatments increased nodulation compared with control, with the highest nodule numbers and seed yield given by *Rhizobium* + urea. *Vigna radiata* seeds were inoculated with *Rhizobium* and/or VAM, *Glomus fasciculatum*. Shoot and root lengths, number of pods/plant and dry weight of pods increased with dual inoculation. Also, seed yield was significantly higher with *Rhizobium* + VAM compared with no inoculation (**Das *et al* 1997**). **Provorov *et al* (1998)** mentioned that inoculation mungbean seeds with commercial strain CIAM1901 of *Bradyrhizobium* sp. (Phaseolus) increased herbage mass by 46.6 ± 6.0%, seed mass by 39.2 ± 3.6%, mass of 1000 seeds by 16.0 ± 0.8% and nitrogen content in seeds by 58.3 ± 8.9%. Cowpea seeds inoculation with VAM increased plant height, number of branches / plant, weight of 100 seeds, total dry seed yield per feddan and protein and phosphorus percentages (**Abdel-Ati 2000**). Finally, **Chowdhury *et al* (2000)** reported that dry matter production of mungbean increased with *Rhizobium* inoculation.

Therefore the present study was undertaken to identify suitable biofertilizer and find out the optimum dose of phosphorus fertilizer for mungbean plants grown under Mariout region conditions.

MATERIAL AND METHODS

The effect of the combination between four levels of phosphatic fertilizer i.e. 0, 15, 30 and 45 Kg P_2O_5/fed. in form of Calcium Superphosphate 15.5% P_2O_5 and three forms of biofertilization i.e. *Rhizobium* sp., *Bacillus megatherium* (phosphate dissolver) and their mixture (*Rhizobium* and *Bacillus*) on some growth, forage yield, seed yield characters as well as chemical content of mungbean (*Vigna radiata* (L.) Wilezek) was tried. The experimental work was carried out during 2002 and 2003 summer seasons in Mariout Research Station of Desert Research Center. The soil of the experimental field in the upper 30 cm is characterized as sandy clay loam in texture with pH value 8.4 and EC 2.97 mmhos/cm. The experiment was implemented in split plot design where biofertilization treatments were allocated in the main plots whereas the sub-main plots were occupied with phosphorus levels. Such treatments were replicated four times where two of them were devoted to growth and forage yield parameters and the others for seed yield and its attributes. The area of the sub plot was 10.5 m^2 (3 × 3.5 m) consisting six ridges 50 cm width and 2.5 m length. Seeds of mungbean (*Vigna radiata* (L.) Wilczek) Kawmy 1 genotype were kindly provided by the Agricultural division, NRC and planted on one side of the row on May 5 and 11 in the first and second season, respectively. The distance between hills were 20 cm. The seedlings were thinned two weeks later to leave 2 seedlings / hill. Ten guarded plants from every sub-plot in the two replicates of growth and forage yield were chosen at 60 days age. Plant height (cm), No. of branches / plant, leaf area (cm^2), specific leaf weight (mg / cm^2) and fresh and dry forage yields were recorded. Protein percentage in mungbean herbage was determined by improved microkjoldahl method described by **A.O.A.C. (1980)**. Crude fiber and total ash were determined according to the **A.O.A.C. (1980)**. Whereas the plants grown in the other two replicates were left intact till they reached full maturity (75 days after sowing) and the following measurements were recorded at harvest:

1- No. of pods/plant
2- No.of seeds / pod
3- Pod length (cm)

4- Seed / husk ratio
5- Seed index "weight of 100 seeds
6- Harvest index was calculated according to the following equation:

Harvest index =
Economic yield / Biological yield × 100 ----------------------- **(Beadle, 1993)**

7- Seed yield (ton / fed.)

All data obtained were statistically analyzed and L.S.D. was used to compare the significant differences of treatment means according to the mouthed outlined by **Gomez and Gomez (1984)**. Data of the two growing seasons was exposed to homogeneity test and the combined analysis of variance was performed for the data of the two seasons.

RESULTS AND DISCUSSION

1- Growth and forage yield

The mean values of growth and forage yield parameters of mungbean plants as influenced by phosphorus fertilizer and bio-fertilizer resources are presented in Table (1). The results show a significant effect on all tested growth and forage yield parameters of mungbean plants due to raising phosphorus levels up to 45 Kg P_2O_5/fed. excepting number of branches / plant which the differences between means of such trait were not great enough to reach the significance level. All growth characters investigated i.e. plant height, number of branches per plant, leaf area and specific leaf weight were clearly increased with increasing phosphorus levels up to the highest level of phosphorus fertilization (45 Kg P_2O_5/fed.). Consequently the highest mean values of fresh and dry forage yields (1.358 and o.245 ton / fed.) were obtained by using 45 Kg P_2O_5/fed. comparing with the other levels of phosphorus fertilization used. It might be due to the fact that P application improves the root-system through accelerating various metabolic process such as cell-division, cell development and cell enlargement. Such results confirm the findings of **Sharma and Room (1997)**, **Tomar *et al* (1996)**, **Abdel-Ati (2000)**, **Mandal and Sikder (1999)** and **Chowdhury *et al* (2000)**.

Data in the same Table indicate also that both plant height and specific leaf weight had no significant effect in their response to different resources of bio-fertilizers i.e. *Rhizobium*, *Bacillus megatherium* and their mixture. Whereas, there was a tendency to increase in the above mentioned two traits with using *Bacillus megatherium* (phosphate dissolver). On the other hand, number of branches / plant, leaf area and fresh and dry forage yields were responded significantly to such resources of bio-fertilizers. The largest leaf area and the maximum value of specific leaf weight were achieved when mungbean seeds were inoculated with *Bacillus megatherium* followed by *Rhizobium* and the mixture of *Rhizobium* and *Bacillus*. In addition, fresh and dry forage yields followed closely the same trend of all studied growth characters in their response to the three bio-fertilizer treatments under the study. Generally, fresh and dry forage yields were increased by about 107.5, 168.0 and 104.5, 206.8% as a result of using *Bacillus megatheirum* compared with *Rhizobium* and the mixture of the two strains, respectively. In this respect, **Provorov *et al* (1998)** mentioned that inoculation of mungbean with commercial strain CIAM 1901 of *Bradyrhizobium* sp. (Phaseolus) increased herbage mass by 46.6 ± 6.0 %.

Table 1. Effect of phosphorus fertilization and bio-fertilizer resources on some growth and forage yield parameters of mungbean plants (Combined analysis of 2002 and 2003 growing seasons)

Traits	P levels (Kg P_2O_5/fed.)				LSD 5%	Bio-fertilizers			LSD 5%
	0	15	30	45		R	B	M	
Plant height (cm)	33	34	36	41	8.0	31	41	35	NS
No. of branches/ plant	12	11	12	12	NS	9	14	13	2.0
Leaf area (cm^2)	116	119	128	140	20.0	120	149	109	25.0
SLW (mg/cm^2)	4.10	4.38	4.89	5.50	0.99	4.51	5.26	4.38	NS
FFY (ton/fed.)	0.673	0.791	1.043	1.358	0.508	0.753	1.563	0.583	0.903
DFY (ton/fed.)	0.119	0.129	0.160	0.245	0.105	0.132	0.270	0.088	0.156

R = *Rhizobium*
B = *Bacillus*
M = Mixture of *Rhizobium* + *Bacillus*
SLW = Specific leaf weight
FFY = Fresh forage yield
DFY = Dry forage yield

2- Seed yield and its components

From the data of the combined analysis presented in Table (2), it could be seen that increasing phosphorus levels from 0 to 45 Kg P_2O_5/fed. resulted in significant increase in mungbean seed yield and its attributes as well as both of seed index and harvest index. It is worth to note that most of seed yield contributing characters i.e. No. of pods / plant, No. of seeds / pod, seed index and harvest index were increased gradually and significantly by raising phosphorus dose up to the highest level (45 Kg P_2O_5/fed.). Whereas the maximum value of seed / husk ratio was achieved when mungbean plants were fertilized by 30 Kg P_2O_5/fed.. Consequently, seed yield was markedly increased by raising phosphatic fertilization up to 45 Kg P_2O_5/fed.. It could be deduce that application of phosphorus fertilizer up to 45 Kg P_2O_5/fed. to mungbean plants pronouncely increased seed production. This due mainly to that effect on increasing the vegetative growth parameters of mungbean plants (Table 1). These increments in plant canopy helped the plants to intercept more light intensity, caused an increase in the assimilation rate and converted to chemical energy stored in seeds.

Table 2. Effect of phosphorus fertilization and bio-fertilizer resources on mungbean seed yield and its components (Combined analysis of 2002 and 2003 growing seasons)

Traits	P levels (Kg P_2O_5/fed.)				LSD 5%	Bio-fertilizers			LSD 5%
	0	15	30	45		R	B	M	
No. of pods/plant	20	26	28	35	8.0	27	33	23	NS
No. of seeds/pod	10	11	11	12	0.4	10	12	11	1.0
Seed/husk ratio	1.77	1.63	2.39	2.12	0.22	1.93	2.26	1.73	0.32
Seed index	3.10	3.29	3.32	3.47	0.11	3.10	3.38	3.41	0.19
Harvest index	0.12	0.12	0.13	0.17	0.02	0.11	0.15	0.15	NS
Seed yield (ton/fed.)	0.186	0.238	0.249	0.292	0.087	0.215	0.232	0.277	NS

These findings are in agreement with those obtained by **Shukla and Dixrr (1996); Sexena *et al* (2000).** They demonstrated that application of phosphorus enhanced No. of branches, pods / plant, harvest index and grain yield of green gram.

Although different bio-fertilizer resources used (phosphate dissolving bacteria, *Rhizobium* and their mixture) induced observable and significant differences on No. of seeds / pod, seed /husk ratio and seed index, they did not exhibit any statistical significant differences between No. of pods / plant, harvest index and seed yield of mungbean plants (Table, 2).

Relevant results indicate that inoculation mungbean seeds with phosphate dissolving bacteria (*Bacillus megatherium*) gave the highest values of mungbean seeds yield and its contributing characters. In this connection, **Das *et al* 1997** stated that No. of pods / plant, dry weight of pods and seed yield of mungbean plants were significantly higher when *Vigna radiata* seeds were inoculated with *Rhizobium* and/or VAM, *Glomus fassiculatum*.

3- Chemical constituents:

The results in Table (3) indicate clearly that both of crude protein and ash percentages of mungbean plants were not significantly affected by increasing phosphorus level, from 0 to 45 Kg P_2O_5/fed.. However there was a tendency to increase in such previous chemical constituents as phosphorus levels increased up to the highest level (45 Kg P_2O_5/fed.). The stimulated effect of P-supply on protein and ash contents may be attributed to the increase in root development and absorbing efficiency of plant roots for nitrogen and other minerals. On the other side, crude fiber content was significantly decreased from 16.01 to 14.55 % by raising phosphorus fertilizer levels from 0 to 45 Kg P_2O_5/fed..

Table 3. Effect of phosphorus fertilization and bio-fertilizer resources on some chemical constituents of mungbean plants (Combined analysis of 2002 and 2003 growing seasons)

Traits	P levels (Kg P_2O_5/fed.)				LSD 5%	Bio-fertilizers			LSD 5%
	0	15	30	45		R	B	M	
C P %	10.32	10.46	11.98	12.83	NS	11.05	11.08	12.06	NS
C F %	16.01	16.66	15.37	14.55	1.68	15.35	16.99	14.60	1.76
Ash %	19.95	20.13	20.40	21.12	NS	20.32	19.69	21.19	NS

CP = Crude protein CF = Crude fiber

Concerning the effect of bio-fertilizer resources on the chemical composition of mungbean plants, data illustrated in Table (3) show also that different bio-fertilizer resources used in this study had no significant effect on both of crude protein and ash contents. Whereas using *Bacillus megatherium* as bio-fertilizer for mungbean plants led to a significant increase in crude fiber percent compared with the other two bio-fertilizer resources. Such increment in crude fiber exceeded that of *Rhizobium* and the mixture of *Bacillus* and *Rhizobium* by about 10.68 and 16.36%, respectively. In this concern, **Naidu and Hanuman (1996)** found that protein content was higher by seed inoculation with *Rhizobium* USDA-3463 strain than M4 strain.

4- Significant interaction effects

a- On growth and forage yield parameters

Data presented in Table (4) show that the interaction between phosphorus levels and bio-fertilizer resources had significant effect on leaf area, specific leaf weight and both of fresh and dry forage yield of mungbean plants. The highest value of leaf area was produced from the interaction between the second level of phosphorus i.e. 15 Kg P_2O_5/fed. and using *bacillus megatheirum* as bio-fertilizer source. Whereas the lowest value of previous trait was obtained when mungbean plants were fertilized by the highest level of phosphorus (45 Kg P_2O_5/fed.) and the mixture of the two bacteria species under study. The results also show that application of 45 Kg P_2O_5/fed and *Rhizobium* sp. Produced the maximum value of specific leaf weight while the lowest value was obtained when 30 Kg P_2O_5/fed. was interacted with *Rhizobium*. It is clear from data in Table (4) also that both of fresh and dry forage yields take the same trend in their response to the interaction between the two factors under study. Whe.e the highest values of 3.161 and 0.600 ton / fed. for fresh and dry forage yields were achieved ,respectively when the highest level of phosphorus (45 Kg P_2O_5/fed.)

Table 4. Effect of interaction between phosphorus levels and bio-fertilizer resources on some growth and forage yield parameters of mungbean plants (Combined analysis of 2002 and 2003 growing seasons)

Treatments		Traits			
		Leaf area (cm^2)	SLW (mg/cm^2)	FFY (ton/fed.)	DFY (ton/fed.)
P_1	R	99	5.25	0.344	0.051
	B	154	5.29	1.000	0.181
	M	96	5.91	1.787	0.250
P_2	R	120	3.49	0.316	0.046
	B	160	6.07	1.272	0.241
	M	140	3.57	0.432	0.069
P_3	R	115	3.12	1.113	0.174
	B	140	4.45	0.388	0.054
	M	134	4.74	0.873	0.160
P_4	R	146	6.14	0.561	0.080
	B	144	5.22	0.352	0.054
	M	66	3.32	3.161	0.600
LSD 5%		38	1.85	0.952	0.016

P_1 = 0 Kg P_2O_5/fed. R = *Rhizobium*
P_2 = 15 Kg P_2O_5/fed. B = *Bacillus megatherium*
P_3 = 30 Kg P_2O_5/fed. M= Mixture of *Rhizobium & Bacillus*
P_4 = 45 Kg P_2O_5/fed. SLW = Specific Leaf Weight
FFY = Fresh Forage Yield DFY = Dry Forage Yield

was interacted with the mixture of *Rhizobium* and *Bacillus*. Whereas the second level of phosphorus (15 Kg P_2O_5/fed.) × *Rhizobium* interaction produced lesser values of both fresh and dry forage yields.

B- On seed yield and its components

With respect to effect of the interaction between phosphorus levels and bio-fertilizer resources on mungbean seed yield and its components (Table, 5) it is clear that the above mentioned interaction had significant effect on seed yield and some contributing characters i.e. No. of pods / plant, No. of seeds / pod, seed / husk ratio, seed index and harvest index. The highest values of No. of pods / plant, seed / husk ratio and seed yield in ton/fed, were achieved by 30 Kg P_2O_5/fed and inoculated mungbean seeds with *Bacillus megatherium*. Whereas the unfertilized

Table 5. Effect of interaction between phosphorus levels and bio-fertilizer resources on mungbean seed yield and its components (Combined analysis of 2002 and 2003 growing seasons)

P_2O_5 (Kg/fed.)	Bio-fertilizer resources	Traits					
		No. of pods/plant	No. of seeds/pod	Seed/husk ratio	Seed index	Harvest index	Seed yield (t/fed.)
0	R	7.0	9.0	2.83	3.00	0.09	0.057
	B	20.0	12.0	1.57	3.23	0.06	0.177
	M	33.0	11.0	1.96	4.19	0.23	0.326
15	R	21.0	11.0	1.44	3.08	0.14	0.222
	B	23.0	11.0	1.98	3.58	0.09	0.190
	M	35.0	12.0	1.76	3.22	0.15	0.303
30	R	36.0	11.0	1.57	3.20	0.16	0.331
	B	46.0	13.0	4.14	3.65	0.22	0.363
	M	24.0	11.0	1.46	3.10	0.13	0.162
45	R	29.0	11.0	1.87	3.12	0.22	0.250
	B	19.0	12.0	1.67	3.06	0.10	0.178
	M	39.0	11.0	1.76	3.11	0.09	0.318
L.S.D. %		15.0	0.76	0.42	0.20	0.03	0.164

R = *Rhizobium* B = *Bacillus megatherium* M = Mixture of *Rhizobium* + *Bacillus*

mangbean plants gave the maximum values of seed index and harvest index when the mixture of *Rhizobium* and *Bacillus* was used. The highest No. of seeds/pod was recorded from the plants fertilized by the highest rate of phosphorus (45 Kg P_2O_5/fed.) and using *Bacillus megatherium* as bio- fertilizer.

It could be concluded that the promising treatment for fresh and dry forage yield of mungbean could be achieved by using *Bacillus megatherium* as bio-fertilizer and when mungbean plants were fertilized by 45 Kg P_2O_5/fed. Also the highest seed yield was obtained by the highest level of phosphorus fertilization and the mixture of *Rhizobium* and *Bacillus* under Mariout region conditions.

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المحصول العلفى والقيمة الغذائية لنبات فول المانج متأثرا بالتسميد المعدنى والحيوى تحت ظروف منطقة مريوط

[١٠]

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أقيمت هذه الدراسة بمحطة بحوث مريوط التابعة لمركز بحوث الصحراء خلال موسمى صيف ٢٠٠٢ و ٢٠٠٣ وقد أقيمت هاتين التجربتين لدراسة تأثير أربعة مستويات من التسميد الفوسفاتى هى صفر - ١٥ - ٣٠ - ٤٥ وحدة فو٢أ٥ للفدان وكذلك ثلاثة مصادر للتسميد الحيوى هى الريزوبيم والبكتريا المذيبة للفوسفات ومخلوط النوعين البكتيريين السابقين على كل من صفات النمو والمحصول العلفى

والبــذرى وكــذلك التركيــب الكيمـــاوى لنباتــات فول المانج.

ويمكن تلخيص أهم النتائج المتحصل عليها فى الآتى

١- تزايدت كل صفات النمــو المدروســة (ارتفاع النبات - عدد الافرع بالنبات - مساحة الورقة - الوزن النوعى للورقة) بزيادة مستويات التسميد الفوسفاتى حتــى ٤٥ وحدة فو٢ا٥ / فدان.
كذلك كان هناك منعطف نحو الزيادة فى صفات النمو المدروسة باستخدام البكتيريا المذيبة للفوسفور وقد وصلت هذه الزيادة الى حد المعنوية فى كــل مــن مســاحة الورقة وعدد الافرع بالنبات.

٢- أمكن الحصول على أعلى محصول من العلف الغض والجاف بأســتخدام أعلــى معدل من التسميد الفوسفاتى (٤٥ وحــدة فو٢ا٥ / فدان) وكــذلك عنــد أســتخدام البكتيريا المذيبة للفوسفات.

٣- أدت زيادة مستويات التسميد الفوســفاتى وأيضا أستخدام البكتيريا المذيبة للفوسفات الى زيادة محصول البــذور والصــفات المساهمه فيه.

٤- على الرغم من عدم تأثر كل من النسبة المؤية للبروتين الخام وكذلك الرماد الكلى بزيادة مستويات التسميد الفوسفاتى الا أن الالياف الخام قد تناقصت معنويــا مــن ١٦,٠١ الى ١٤,٥٥ %. كذلك لم يــؤثر أستخدام مصادر مختلفة مــن التســميد الحيوى تأثيرا معنويا علــى كــل مــن البروتين الخام والرماد الكلى فى حــين أدى أستخدام البكتيريا المذيبة للفوســفات الى زيادة معنوية فــى النســبة المؤيــة للالياف الخام.

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أ.د زينب محمــــود نصـــــار