Influence of Organic Manures and Rock Phosphate Combined With Feldspar on Growth, Yield and Yield Components of Bean (*Phaseolus vulgaris* L.)

A. M. Ahmed, R.H. M. Gheeth and R. M. Galal
Veg. Res. Dept Hort. Res. Inst., Agric. Res. Center Giza, Egypt.

Abstract:

The work was carried out at Sids Horticulture Research Station, Beni-Sueif Governorate during the two successive fall seasons of 2011and 2012 to study the effect of organic manures, i.e., sheep manure ,farmyard manure and mixture between of both them (a mixture at 1:1) at the levels of 10 and 20 m^3/fed in presence of fertilization with rock phosphate and feldspar rates viz., ($15P_2O_5$ + $25K_2O$, $30P_2O_5$ + $50K_2O$ and $45P_2O_5$ + $75K_2O$) kg/fed on plant growth, total chlorophyll in leaves, protein and fiber percentage in green pods, green pod and dry seed yields and their components as well as chemical constituents in dry seeds of common bean cv. "Bronco"

Results showed that the application of organic manures had no significant effect on plant height and leaves total chlorophyll during the two growing seasons. Sheep manure produced higher number of branches, protein percentage in green pods, pod length, number of seeds per pod and seed contents of phosphorus and potassium in the two growing seasons, Also, it increased leaf area in the second season, nitrogen and protein percentage of dry seeds in the first season. Also, farmyard manure improved fiber percentage in the two seasons. Whereas, applying sheep manure + farmyard manure significantly increased plant dry weight, diameter and weight of green pods, green pod yield , number of pods per plant, weight of 100- seeds and dry seed yield during the two growing seasons. Also, it gave the highest dry pod weight and weight of seeds per pod in the first season.

Organic manure level at 20 m^3/fed resulted in the highest of all plant growth characters, leaves contents of chlorophyll, protein percentage in green pods, green pods and seed yields and their components as well as dry seed contents of nitrogen, protein, phosphorus and potassium during the two growing seasons. On the other hand, organic manure level at the rate of 10 m^3/fed increased fiber percentage in green pods in the two growing seasons.

Fertilization with rock phosphate and feldspar with high rate ($45P_2O_5$ + $75K_2O$ kg/fed) markedly increased plant height, number of branches, leaf area, protein and fiber percentage in green pods and seed contents of nitrogen, protein, phosphorus and potassium during the two growing seasons. Plant dry weight, total chlorophyll in leaves, green pod and dry seed yields and their components were significantly increased with rock phosphate combined with feldspar at $30P_2O_5$ + 50 K_2O kg /fed during the two growing seasons.

It may be recommended to fertilize common bean cv. "Bronco" with sheep manure + farmyard manure at the rate of 20 m^3/fed (from total mixed) and rock phosphate combined with feldspar at the rate of $30P_2O_5$ + $50K_2O$ kg /fed , to produce high green pod, dry seed yields and their components.

Key words: *Phaseolus vulgaris*, organic manures, rock phosphate and feldspar

Received on: 8 /5 /2013 **Accepted for publication on:** 29/ 6 /2013
Referees: Prof. Mohamed M.A. Abdullah **Prof**. Sayed A. AbdelAal

Introduction:

Common bean (*Phaseolus vulgaris* L.) is one of the important vegetable crops in Egypt for local marketing and exportation. Also, dry beans area important protein source of the human diet. It is also the second important vegetable crop for exportation in Egypt after potato.

Organic manures must be added to improve the chemical and physical properties of soil, reducing pH and electric conductivity, increasing soil organic matter content and release of nutrient elements. Soils of high organic matter and recognized as fertile, because of the constantly release of nutrients during the time of decomposition. Decomposition of organic manure produces organic acids which play an important role for solubility the natural fertilizers and in turn increasing available P and K from the added rocks. Application of organic manures avoided the pollution, reducing the costs of mineral fertilization and would be safe for human, animal and environment (El-Kina and Konstantinova, 1998 and Youssef *et al*.,2001).

Organic manures, i.e., farmyard manure and sheep manure and natural at alternative fertilizers such as rock phosphate [$Ca_{10}(Po_4)_4F_2$] and potassium feldspars ($KAISi_3O_8$) have been reported to have great effect on plant growth , total chlorophyll in leaves, protein and fiber percentage in green pods, green pods, dry seed yields and their components as well as chemical composition of seeds.

Application of organic manures and its levels were reported to have a considerable increase in plant growth of beans (Singer *et al.*, 1999; Magda and Asmaa, 2004; Teixeira *et al.,* 2008 and Nawalagatti, 2009).

The green pod yield depend on many factors of which the most important are the used varieties, organic fertilization and alternative natural fertilizers (sources of phosphorus and potassium fertilization). Organic fertilization which have an important role on green pod yield and its components has been studied by many authors on beans, Rhoads and Olson (1995); Gaber (2000); Aryal *et al.* (2003) and Lunazendejas (2011) they indicated that compost application produced higher yield of beans. Also, seed yield and its components significantly affected by organic manures. Tamayo and Munoz (1996); Venturini *et al.* (2005) and Ferreira *et al.* (2010) found that application of poultry slaughter pigs enhancement number of pods/ plant, number of grains per pod, thousand grain weight and seed yield of beans.

Organic manures and its levels gave significant increase in chlorophyll, nitrogen, phosphorus and potassium contents and uptake rate of beans as mentioned by Gaber (2000); Magda and Asmaa (2004) and Lalljee (2006).

Application of rock phosphate (rock P) and potassium (rock K) may be agronomically more useful and environmentally more feasible than soluble P and K (Rajan *et al*., 1996). The alternative use of natural elements compounds are improve the soil physical, chemical properties as well as increased water uptake and nutrient availability (Eman *et al*., 2010). Natural elements compounds as rock phosphate and feldspar used as a source of some nutrient minerals this management are considered clean or organic agriculture and these compounds improving soil aggregation, structure, permeability, infiltration and electric conductivity.

Rock phosphate application was beneficial for plant growth, Garica (1997) on common bean; Satpal and Kapoor (2000) on mung bean; Manjunath *et al*. (2006) on beans and Nachimuthu *et al*. (2009) on peas.

The benefical effects of applying natural rocks, on increasing green pod yield and its components of beans were reported by many investigators. The importance of rock phosphate application was noticed by Nekesa *et al*. (1999) on common bean and Ndung'u *et al*. (2006) on wheat , chick pea and cluster bean, they mentioned that application of Minjingu rock phosphate (MRP) at the rate of 60 kg/ha significant increases yield of beans. Moreover, rock phosphate application markedly increased seed yield and its components of beans (Dwivedi *et al*. (1995); Rodriguez and Herrera (2002) and Ndakidemi (2007).

With respect to plant chemical composition of beans , Garica (1997) ; Rodriguez and Herrera (2002) and Ogut *et al*. (2005) reported that inoculation with Azospirillum + Trichoder maharzianum and rock phosphate increased total N and P in seeds of beans. Concerning the effect of rock feldspar on the growth characters, Ezzat *et al*. (2005) on Lentil, stated that, increasing feldspars application level up to 360 kg /fed increased plant height and number of branches.

Some trials have been reported on the effect of rock feldspar on the yield, Abd El-Lattif *et al*. (2007) working on faba bean stated that application of feldspar plus Bacillus circulants increased yield. It was found also that feldspars increase seed yield and its components Ezzat et al., (2005) on Lentil and Hassan (2010) working Khella plants, indicated that applying feldspar at 256 kg/fed increased number of umbels/plant and seed yield.

The positive effect of feldspar applications on N, protein, P and K contents in seeds were reported by Ezzat *et al*. (2005) on Lentil; Seddik (2006) on peanut and Abd El-lattif (2007) on faba bean.

In regards to the effect of organic manures, rock phosphate and feldspar interactions on yield and chemical composition were studied by Aery *et al*. (2004) on pigeon pea; Hellal *et al*. (2009) on faba bean and Ghada (2012) on maize, reported that application of rock phosphate at 300 kg/fed + feldspar at 400 kg/fed and nitrogen at 120 kg N/fed plus farmyard manure at 10 t/fed increased N, P and K uptake and straw yield.

The aim of the present study was to investigate the effect of sheep and farmyard manures and rock phosphate combined with feldspar on growth, total chlorophyll in leaves, protein and fiber in green pods, green pod, seed yields, as well as components and seed's chemical composition of common bean cv. "Bronco".

Materials and Methods:

This investigation was conducted at Sids Horticulture Research Station Beni Sueif Governorate during the two successive fall seasons of 2011 and 2012 on common bean cv. "Bronco" to study the influence of adding sheep manure, farmyard manure and mixture between both of them and rock phosphate combined with feldspar as a sources by phosphorus and potassium elements on the growth, total chlorophyll in the leaves, protein and fiber percentage in green pods, green pod and seed yields , their components and seed's chemical constituents.

Soil of the experimental site was loam in texture. Chemical analysis of the soil was carried out at the Laboratories of Soil Research Institute, Agriculture Research Center at Sids by the official methods of Jackson (1958) as shown from Table (1).

Table (1) : Chemical analysis of the experimental soil.

Seasons	Available (ppm)			Organic matter%	PH
	N	P	K		
2011	23.7	16.6	287.5	2.4	7.5
2012	25.2	14.5	312.1	2.2	7.3

The chemical and physical properties of each organic manure were determined as previously according to Chapman and Paratt (1978) and presented in Table (2).

Table (2): Chemical and physical analysis of the organic manures applied in soil experiment.

Organic manure	Sheep manure		Farmyard manure	
	1st season	2nd season	1st season	2nd season
Total nitrogen %	0.86	0.90	0.42	0.48
Total phosphorus %	0.49	0.46	0.33	0.30
Total potassium %	1.29	1.31	1.01	1.12
Organic matter %	68.74	71.03	44.19	40.82
Organic carbon %	40.47	44.00	22.36	25.95
C: N soils	12.0: 1	14.2: 1	26.3:1	22.2:1
pH (1: 2.5 extract)	7.43	7.85	7.71	7.96
E.C (ds / m^{-1})	5.86	6.12	4.76	5.21

The chemical analysis of rock phosphate and feldspar were determined according to Alahram company for mining and natural fertilizers as shown in Table (3).

Table (3): Chemical analysis of the rock phosphate and feldspar which were applied in soil experiment.

Oxides	Rock phosphate		Feldspar	
SiO_2	6.85	%	70.65	%
Al_2O_3	0.76	%	17.89	%
Fe_2O_3	4.17	%	0.14	%
MgO	2.05	%	0.01	%
CaO	41.05	%	0.58	%
K_2O	0.20	%	10.1	%
P_2O_5	25.06	%	0.08	%
L. O. I	14.10	%	0.37	%
SO_3	4.00	%	-	

Two manure sources and mixture between both of them (a mixture at 1:1) were used, i.e., sheep manure, farmyard manure and sheep manure + farmyard manure at the levels of 10 and 20 m^3/fed per each and rock phosphate combined with rock feldspar at three rates, i.e., (Low : 15 P_2O_5 + 25 K_2 O, Medium: 30 P_2O_5 + 50 K_2 O and High : 45 P_2O_5 + 75 K_2O) kg /fed. Phosphorus (P) was applied in the form of rock phosphate (25.06% P_2O_5) and potassium (K) was applied in the form of feldspar (10.1% K_2O). Rock phosphate was applied once before planting irrigation. Feldspar was splitted in to equal doses and applied 20 and 45 days after planting. The organic manures were applied during the soil preparation. The experimental layout was split split plot design with four replications. The main plots allocated for sheep manure, farmyard manure and mixture between both of them, the levels of manures were randomly distributed in the sub plots and rock phosphate combined with feldspar were randomly distributed in the sub sub plots. Each experimental plot consisted of five rows 3.5 m long and 0.7 m wid. Area of plot was (12.25 m^2).

Seeds were sown on the 2nd and 5th of September, 2011 and 2012 seasons, respectively. Seeds were treated with phosphorien at 1 kg /fed as source for "Bacillus megaterium" phosphate dissolving bacteria" before sowing and all plots were inoculated with potassium at 2 liter/fed after 20 days from planting as a liquid source for "Bacillus circulants". Common agricultural practices for common bean production other than the mentioned treatments were followed.

Ten plants were chosen at random in each plot after 60 (beginning of pod formation) days from planting were used for recording the following data.

A- Plant growth:

1- Plant height (cm).
2- Number of branches / plant.
3- Leaf area (cm^2): was determined by leaf area and leaf weight relationship using leaf disks obtained by a cork borer according to Wallace and Munger (1965).
4- Dry weight of plant (g), the samples were dried in electric oven at 70 ° C till constant weight.

B- Total chlorophyll in leaves, protein and fiber contents in green pods:

Leaf samples were collected randomly from five plants from each experimental plot, and washed with distillation water to determine chlorophyll a and b, using calorimetric method at wavelength of 660 and 642 nm respectively, according to Brougham (1960). Concentration of total chlorophyll was obtained by the summation of chlorophyll a and b.

Twenty green pods were taken at random from each plot from the second harvest and dried at 70C^o till a constant weight to determine the protein by using the Micro-Kjeldahl method and fiber percentage was determined using A.O.A.C. (1970).

C- Green pod yield and its components:

at harvest time on the 10th and 15th November in 2011 and 2012 respectively. Each experimental plot was harvested 3 times at one week intervals in both seasons and green pod yield per fed was calculated. Twenty pods were taken at random from each experimental plot to determine the following characters:

1- Pod length (cm).

2- Pod diameter (cm).
3- Pod weight (g).

D- Dry seed yield and its components: Harvesting of dry seeds was started on the 25th and 29th December in 2011 and 2012 respectively. The following data were recorded:

1- Dry seed yield / "ton /fed "
2- Number of pods per plant: Five plants were taken at random from each experimental plot were labeled and number of pods/plot were calculated.

Thirty pods were taken at random from each plot to determine the following characters:

1- Dry pod weight (g).
2- Number of seeds / pod .
3- Weight of seeds / pod (g).
4- Weight of 100-seeds (g).

E- Chemical analysis of seeds:

Sample at 100g from seeds were collected randomly from experimental plot and dried at 70 °C a constant weight these samples were grinded and sub samples were treated with sulphuric and perchloric acids to determine the N, protein, P and K on basis of dry weight. Total nitrogen and protein were determined by using the Micro- Kjeldahl method, phosphorus was determined colorimetrically. (A.O.A.C., 1970) and potassium was determined by using Unicam SP 1900 Atomic Absorption Spectrophotometer (Ranganna, 1978).

Data were subjected to the analysis of variance procedures and treatment means were compared by the L.S.D test described by Steel and Torrie (1980).

Results and Discussion:

A- Plant growth:

Data of plant growth characters such as plant height, number of branches, leaf area and plant dry weight are shown in Table (3). Data showed that manure sources had no effects on plant height in the two growing seasons. However, number of branches and leaf area were significantly affected in the two seasons and second season respectively, and the highest values were obtained from sheep manure compared with farmyard manure. On the other hand sheep manure combined with farmyard manure produced the highest plant dry weight in the two growing seasons.

Manure levels had positive effects on plant growth characters in the two seasons. In this regard, manure level at 20 m^3/fed produced higher values of plant height, number of branches, leaf area and plant dry weight as compared to the low rate. The enhancement of manures fertilizer on plant growth characters may be attributed to sheep manure which contains high content of macro nutrients (Table 2) which in turn stimulate vegetative growth and accumulative effect of greater dry matter production, thus increasing number of branches, leaf area and plant dry weight. These results are in line with those obtained by Singer *et al.* (1999); Magda and Asmaa *et al.* (2004); Abubaker (2008); Teixeria *et al*. (2008); Nawalagatti (2009) and Ramos *et al.* (2009) found that applying cotton waste compost up to 80 t/ha significant increase in the plant growth of beans.

Data in Table (3) declared that plant growth parameters were significantly influenced by application of rock phosphate combined with feldspar in the two growing seasons. Hence the highest plant height, number of branches and leaf area were achieved by plants received rock phosphate plus feldspar at the rate of 45 P_2O_5 + 75 K_2O kg/ fed. However,

plant dry weight increased with rock phosphate + feldspar at the rate of 30 P_2O_5 + 50 K_2O kg/fed. This may be due to the role of applications of natural elemental materials as source of phosphorus and potassium promoting and enhancing the metabolic process and regulate water balance (Manning, 2010). These results are in harmony with those obtained by Garica (1997) on beans; Satpal and Kapoor (2000) on mungbean; Manjunath *et al.* (2006) on peas; Shanmugam (2008) on pigeon pea and Nachimuthu *et al*. (2009) on peas for rock phosphate and Ezzat *et al.* (2005) on lentil; Hassan *et al*. (2010) on Khella plants and Gowda *et al.* (2011) on olive trees for feldspar. Massoud *et al.* (2009) for rock phosphate plus feldspar, reported that application of AM.- mycorrhizal fungi, symbiotic and a symobiotic N_2 fixers and Bacillus circulants plus rock phosphate + feldspar increased plant height , number of branches, number of nodules/ plant of snap bean.

Table (3): Effect of sheep and farmyard manures, rock phosphate plus feldspar on plant height, number of branches, leaf area and dry weight per plant of common bean during 2011 and 2012 seasons.

Manure sources "A"	Manure levels m^3/fed "B"	Natural rocks kg/ fed "C"	Plant height (cm)		Number of branches		Leaf area (cm^2)		Plant dry weight (g)	
			2011	2012	2011	2012	2011	2012	2011	2012
Sheep manure (SM)	10	Low	35.30	29.46	4.71	4.60	201.67	180.28	4.73	5.24
		Medium	38.85	32.55	5.68	5.66	217.35	207.63	5.85	6.36
		High	41.62	35.59	6.07	5.56	242.72	220.91	5.00	6.21
	20	Low	44.58	42.67	6.22	5.41	239.67	223.16	6.13	7.31
		Medium	47.37	44.12	6.73	6.07	253.93	247.59	8.12	8.50
		High	49.32	46.00	6.97	6.75	267.14	259.91	7.59	8.87
Mean			42.84	38.39	6.07	5.68	237.08	223.25	6.25	7.08
Farmyard manure (FYM)	10	Low	29.23	26.06	4.56	4.38	163.81	157.17	4.51	4.02
		Medium	33.48	29.29	4.89	4.77	183.04	175.55	5.45	5.42
		High	36.05	31.94	5.20	5.00	220.57	192.78	4.73	5.00
	20	Low	38.27	33.47	4.85	4.69	215.50	186.44	5.67	6.97
		Medium	42.33	34.10	5.75	5.56	231.05	214.99	6.94	8.13
		High	44.12	37.66	6.42	5.88	245.22	230.15	6.42	7.69
Mean			37.25	32.09	5.28	5.04	209.86	192.85	5.62	6.21
Mixture (SM+ FYM)	10	Low	30.62	27.32	4.62	4.75	185.84	150.59	5.20	5.89
		Medium	35.92	30.13	5.40	5.03	210.74	188.76	6.33	7.75
		High	39.44	33.40	5.77	5.49	234.34	214.63	5.76	7.41
	20	Low	40.48	32.97	5.80	5.31	224.13	210.54	8.02	8.56
		Medium	43.65	36.08	6.18	5.73	235.06	219.97	8.77	9.38
		High	46.94	40.45	6.55	6.25	256.71	242.17	8.53	8.92
Mean			39.50	33.39	5.72	5.43	224.47	204.44	7.10	7.99
Mean for "B"		$10m^3$/fed	36.61	30.64	5.21	5.03	206.68	187.59	5.29	5.92
		$20m^3$/fed	44.12	38.61	6.16	5.74	240.88	226.10	7.36	8.26
Mean for "C"		Low	36.41	31.98	5.13	4.86	205.02	184.70	5.71	6.33
		Medium	40.26	34.38	5.77	5.47	221.86	209.08	6.93	7.59
		High	42.92	37.51	6.16	5.82	244.45	226.76	6.34	7.35
L.S.D at (0.05) for :										
Manure source		A	N.S	N.S	0.376	0.376	N.S	21.246	1.014	0.982
Manure levels		B	2.848	2.094	0.251	0.294	24.462	14.242	0.568	0.766
Natural rocks		C	2.343	2.333	0.363	0.509	27.604	15.988	0.757	0.914
Interactions		AB	2.713	2.465	N.S	0.312	N.S	N.S	0.814	N.S
		AC	N.S	N.S	0.409	N.S	N.S	N.S	N.S	N.S
		BC	2.583	N.S	N.S	N.S	N.S	N.S	N.S	1.129
		ABC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

The interaction between sheep manure and manure level at 20m^3/fed it showed positively affect on plant height in both seasons, also it increased number of branches in the second season, while sheep manure + farmyard manure and manure level at 20m^3/fed gave the best plant dry weight in the first season. Also among the sheep manure and natural fertilizers at the rate of 45P_2O_5 + 75K_2O kg/fed enhanced number of branches in first season. Meanwhile, the interaction between manure level at 20m^3/fed plus rock phosphate combined with feldspar at 45P_2O_5 + 75 K_2Okg/fed increased plant height in the first season. The combination between manure level at 20 m^3/fed and natural fertilization at the rate of 30P_2O_5 + 50K_2O kg/fed gave the highest plant dry weight in the second season. On the other hand, all interaction treatments insignificantly affected leaf area in the two growing seasons. Added organic manure enhanced the effect of rock phosphate and feldspar, which may be due to the fact that during the process of organic manure decomposition a wide variety of organic acids, carbonic acids and chelating substances are liberated, consequently help in natural rock, dissolution (Badr, 2006**)**

B- Total chlorophyll in leaves, protein percentage and fiber percentage in green pods:

Data of total chlorophyll content in leaves, protein percentage and fiber percentage in green pods are presented in Table (4) the obtained indicated that manure sources did not show any significant effect on total chlorophyll content of leaves in the two growing seasons. Moreover, application of sheep manure produced significant increase in protein percentage of green pods in the two seasons. Meanwhile, fiber percentage markedly increased with farmyard manure in both seasons.

Total chlorophyll, protein % and fiber %significantly affected by manure levels in the two growing seasons, where as manure level at the rate of 20 m^3/fed gave the highest total chlorophyll and protein%, but fiber % increased with manure level at 10m^3/fed. Such responses to organic manures were reported by Magda and Asmaa (2004) and Shehata *et al*. (2011) showed that application of NPK at 50: 45 : 60 kg /fed + compost at 8 t /fed induced enhancement values of leaves total chlorophyll of snap bean.

Concerning natural fertilizing rock phosphate and feldspar, the data in Table (4) indicated that natural fertilizers had a markedly effects on total chlorophyll, protein percentage and fiber percentage in green pods in both seasons. The plants supplied with rock phosphate plus feldspar at 30P_2O_5 + 50K_2O kg/fed gave the highest total chlorophyll content. On the other hand, protein percentage and fiber percentage were highest in plants fertilized with natural fertilizers at the rate of 45P_2O_5 + 75K_2O kg /fed.

For the interaction, data in Table (4) revealed that applying farmyard manure combined with natural fertilizers as rock phosphate and feldspar at the rate of 45P_2O_5 + 75 K_2O kg/fed and manure level at the rate of 10 m^3/fed plus natural fertilizers as the same rate improved fiber percentage in the first season. On the other hand, all interactions hand no effect on total chlorophyll content and protein percentage in the two seasons.

Table (4): Effect of sheep and farmyard manures, rock phosphate plus feld-spar on leaves total chlorophyll, protein and fiber percentage in green pods of common bean during 2011 and 2012 seasons.

Manure sources "A"	Manure levels m^3/fed "B"	Natural rocks kg/ fed "C"	Total chloro-phyll (mg/100g fresh weight)		Protein %		Fiber %	
			2011	2012	2011	2012	2011	2012
Sheep manure (SM)	10	Low	113.81	118.94	15.75	15.12	9.40	10.90
		Medium	128.46	136.88	16.39	15.10	9.10	10.02
		High	122.51	125.77	17.24	16.47	10.62	11.61
	20	Low	134.90	140.44	16.56	16.38	9.11	9.54
		Medium	158.85	152.08	16.83	17.03	8.84	9.36
		High	151.27	149.04	18.20	17.64	9.66	9.82
Mean			134.97	137.19	16.83	16.28	9.46	10.21
Farmyard manure (FYM)	10	Low	102.30	111.06	14.17	12.96	12.00	12.55
		Medium	124.36	128.16	14.61	14.48	10.68	11.97
		High	116.25	123.58	15.22	14.98	12.46	13.68
	20	Low	128.48	133.52	15.82	15.40	10.36	11.78
		Medium	149.40	149.17	16.60	16.09	9.67	10.36
		High	140.37	144.55	17.49	16.92	10.73	12.50
Mean			126.86	131.68	15.65	15.14	10.98	12.14
Mixture (SM+ FYM)	10	Low	120.94	125.65	14.79	14.42	11.24	11.32
		Medium	136.24	142.23	15.50	15.14	10.20	10.68
		High	131.39	135.19	16.64	15.36	11.51	11.82
	20	Low	142.85	151.08	16.19	15.75	9.40	10.11
		Medium	163.97	170.67	17.09	16.23	9.05	9.48
		High	158.03	164.03	17.58	17.19	9.79	10.69
Mean			142.24	148.14	16.30	15.68	10.20	10.68
Mean for "B"		$10m^3$/fed	121.81	127.50	15.59	14.88	10.80	11.62
		$20m^3$/fed	147.57	150.51	16.93	16.52	9.62	10.40
Mean for "C"		Low	123.88	130.12	15.55	15.01	10.25	11.03
		Medium	143.55	146.53	16.77	15.66	9.59	10.31
		High	136.64	140.36	17.06	16.43	10.79	11.69
L.S.D at (0.05) for :								
Manure source		A	N.S	N.S	0.706	0.762	0.488	0.917
Manure levels		B	11.537	14.105	0.546	0.380	0.390	0.721
Natural rocks		C	8.715	12.215	0.660	0.505	0.203	0.535
Interactions		AB	N.S	N.S	N.S	N.S	N.S	N.S
		AC	N.S	N.S	N.S	N.S	0.351	N.S
		BC	N.S	N.S	N.S	N.S	0.287	N.S
		ABC	N.S	N.S	N.S	N.S	N.S	N.S

C- Green pod yield and its components:

Results in Table (5) showed that green pod yield and its components expressed as average pod length, pod diameter and pod weight as well as green pod yield were significantly affected by manure sources in the two growing seasons. Application of sheep manure increased pod length, whereas pod diameter and weight as well as green pod yield significantly increased with sheep manure + farm-yard manure.

Data in Table (5) declared that manure levels markedly increased green pod yield and its components in both seasons.

Table (5): Effect of sheep and farmyard manures, rock phosphate plus feldspar on pod length, pod diameter, green pod weight and green pod yield of common bean during 2011 and 2012 seasons.

Manure sources "A"	Manure levels m^3/fed "B"	Natural rocks kg/ fed "C"	Pod length (cm)		Pod diameter (cm)		Green pod weight (g)		Green pod yield (ton/fed)	
			2011	2012	2011	2012	2011	2012	2011	2012
Sheep manure (SM)	10	Low	11.07	10.53	0.48	0.52	5.28	5.65	3.027	3.137
		Medium	13.04	11.62	0.52	0.56	5.50	6.28	3.489	3.540
		High	12.10	11.44	0.50	0.53	5.45	6.16	3.261	3.312
	20	Low	13.38	12.50	0.54	0.57	6.24	6.65	3.488	4.319
		Medium	14.56	14.39	0.58	0.62	6.96	6.94	4.092	4.699
		High	13.69	13.20	0.57	0.59	6.68	6.67	3.920	4.482
Mean			12.97	12.28	0.53	0.57	6.02	6.38	3.546	3.915
Farmyard manure (FYM)	10	Low	10.11	9.48	0.45	0.47	4.63	5.05	2.317	2.564
		Medium	11.03	10.60	0.50	0.53	4.97	5.70	2.863	3.055
		High	10.77	10.43	0.48	0.50	4.82	5.36	2.622	2.743
	20	Low	11.34	10.82	0.53	0.55	5.79	6.14	3.256	3.745
		Medium	13.88	12.69	0.57	0.60	6.44	6.67	3.925	4.546
		High	12.50	12.04	0.55	0.58	5.98	6.53	3.638	4.227
Mean			11.61	11.01	0.52	0.54	5.44	5.91	3.104	3.480
Mixture (SM+ FYM)	10	Low	10.25	9.94	0.51	0.54	5.54	5.81	3.109	3.231
		Medium	12.21	11.36	0.55	0.58	5.78	6.56	3.647	3.822
		High	11.30	10.69	0.53	0.56	5.72	6.44	3.399	3.501
	20	Low	12.14	11.98	0.56	0.60	6.57	7.34	3.874	4.434
		Medium	14.41	13.90	0.60	0.64	7.65	7.82	4.579	4.947
		High	13.38	13.07	0.58	0.61	7.13	7.62	4.233	4.669
Mean			12.28	11.82	0.55	0.59	6.40	6.93	3.807	4.101
Mean for "B"		10m3/fed	11.32	10.68	0.50	0.54	5.30	5.88	3.082	3.212
		20m3/fed	13.25	12.73	0.57	0.59	6.60	6.93	3.889	4.452
Mean for "C"		Low	11.38	10.88	0.51	0.54	5.67	6.09	3.179	3.572
		Medium	13.19	12.43	0.56	0.59	6.22	6.66	3.766	4.102
		High	12.29	11.81	0.54	0.56	5.96	6.46	3.512	3.822
L.S.D at (0.05) for :										
Manure source		A	0.892	0.787	0.022	0.0142	0.552	0.605	0.269	0.460
Manure levels		B	0.683	0.789	0.020	0.016	0.404	0.358	0.289	0.475
Natural rocks		C	0.508	0.489	0.022	0.023	0.377	0.328	0.305	0.299
Interactions		AB	N.S	N.S	N.S	N.S	0.562	N.S	0.313	N.S
		AC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
		BC	N.S	N.S	N.S	N.S	0.400	0.364	N.S	0.313
		ABC	N.S	N.S	N.S	N.S	N.S	N.S	0.477	N.S

The highest mean values were obtained from manure level at the rate of 20 m^3/fed. These increases may be attributed to organic manure enhance the plants absorb more water and nutrients, consequently increase photosynthesis activity, in turn increase cell division and stem elongation. Also, soil physical properties were improved and which in turn increased roots penetration and extension causing more water and nutrients adsorption by plants. Obtained results are in agreement with those reported by Roads and Olsan (1995); Gaber (2000); Aryal *et al*.(2003); Lalljee (2006); Ramos *et al.* (2009); Masanta and Biswas (2009); Lunazendejas and Olfati *et al*. (2012) mentioned that the highest total yield, number of pods

per plant, pod dry matter and pod weight were obtained from solid waste compost and spent mushroom compost application up to 300 Mt /ha of French dwarf bean.

Regarding to the influence of rock phosphate combined with feldspar treatments, the data recorded in Table (5) pointed out that the main effect of natural fertilizers on green pods yield and its components was statistically significant during the two growing seasons. It is clear that adding rock phosphate + feldspar at the rate of $30P_2O_5 + 50K_2O$ kg/fed led to significant increases in green pods yield and its components. The promotive effect of the studied natural fertilizers on green pods yield in mostly explained by its effect on growth characters e.g. plant height, number of branches, leaf area and plant dry weight which reflected as a positive effect on yield parameters such as pod length, pod diameter and pod weight. Such results are in the same line with those of Nekesa *et al.* (1999); Sisworo *et al.* (2002) and Ndung'u *et al.* (2006) using rock phosphate on beans. Also, Abd El-lattif (2007) working on faba bean with feldspar. Also, Massoud *et al*. (2009) on snap bean and El- Henfy and Youssef (2011) on onion, using rock phosphate combined with feldspar. Massoud *et al*. (2009) who stated that mixture of some biofertilizers plus rock phosphate and feldspar was superior in fresh yield of snap bean.

Data in Table (5) illustrated that the interaction between sheep manure + farmyard manure and manure level at $20m^3$/fed increased pod weight and green pod yield in the first season, also manure level at $20m^3$/fed and rock phosphate+ feldspar at the rate of $30P_2O_5 + 50K_2O$ kg/fed gave the highest pod weight in the two seasons and green pod yield in the second season. However, sheep manure plus farmyard manure and manure level at 20 m^3/fed in presence of rock phosphate combined with feldspar at the rate of $30P_2O_5 + 50K_2O$ kg /fed enhanced green pod yield in the first season. All interactions did not show any significant effects on pod length and pod diameter in both growing seasons. Green pod yield increased by application of natural fertilizers combined with organic manure, which caused in increasing the solubility of P and K rocks and releasing both P and K (Gardner, 1983).

It can be concluded that, application of sheep manure plus farmyard manure at $20m^3$/fed and rock phosphate combined with feldspar at the rate of $30P_2O_5 + 50K_2O$ kg /fed produced higher green pods yield and its components.

D- Dry seed yield and its components:

Seed yield and its components, i.e., average number of pods per plant, dry pod weight, number of seeds per pod, weight of seeds per pod, weight of 100-seeds and yield /fed are shown in Tables (6 and 7). It is clear that the application of sheep manure + farmyard manure increased number of pods/plant, weight of 100-seeds and seed yield in the two seasons, also it increased dry pod weight and weight of seeds per dry pod in the first season. On the other hand number of seeds per pod greatly higher with sheep manure application in the two seasons.

Manure levels markedly increased dry seed yield and its components in the two seasons.

Table (6): Effect of sheep and farmyard manures, rock phosphate plus feldspar on number of pods per plant, dry pod weight, number of seeds per pod, weight of seeds per pod and weight of 100-seed of common bean during 2011 and 2012 seasons.

Manure sources "A"	Manure levels m^3/fed "B"	Natural rocks kg/ fed "C"	Number of dry pods/plant		Dry pod Weight (g)		Number of seeds/pod		Weight of seeds /pod (g)		Weight of 100-seeds (g)	
			2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Sheep manure (SM)	10	Low	20.13	21.75	1.39	1.47	5.41	4.52	1.00	1.12	18.65	21.58
		Medium	23.87	26.37	1.52	1.58	5.82	5.61	1.16	1.24	23.68	25.62
		High	21.42	24.16	1.41	1.49	5.69	5.46	1.11	1.18	21.58	23.14
	20	Low	26.40	27.11	1.64	1.71	5.86	5.53	1.21	1.26	24.42	27.63
		Medium	30.37	32.73	1.75	1.83	6.42	5.99	1.33	1.40	29.97	30.70
		High	28.86	30.81	1.71	1.78	6.10	5.75	1.27	1.36	27.00	29.29
Mean			25.18	27.61	1.57	1.65	5.88	5.48	1.18	1.26	24.22	26.33
Farmyard manure (F YM)	10	Low	18.75	20.82	1.14	1.21	4.40	4.25	0.81	0.90	16.09	18.82
		Medium	20.80	23.79	1.30	1.43	5.03	4.71	1.00	1.09	20.19	21.80
		High	20.33	22.62	1.17	1.28	4.57	4.49	0.90	1.00	17.46	19.63
	20	Low	24.15	26.58	1.52	1.58	5.48	4.80	1.10	1.17	23.14	24.34
		Medium	28.03	31.09	1.65	1.76	6.01	5.56	1.29	1.34	28.51	29.34
		High	26.58	28.58	1.56	1.63	5.64	5.45	1.18	1.24	25.24	27.42
Mean			23.11	25.58	1.39	1.48	5.19	4.88	1.05	1.12	21.77	23.56
Mixture (SM+ FYM)	10	Low	22.91	24.00	1.44	1.52	4.90	4.38	1.07	1.15	20.49	23.54
		Medium	27.43	29.94	1.63	1.69	5.49	5.42	1.23	1.31	26.77	27.10
		High	25.61	27.50	1.50	1.58	5.40	5.24	1.14	1.20	22.73	25.12
	20	Low	28.60	31.85	1.72	1.77	5.52	5.19	1.30	1.39	28.98	30.16
		Medium	33.60	36.71	1.89	1.95	6.16	5.72	1.42	1.55	32.85	33.28
		High	31.69	33.78	1.80	1.86	5.78	5.59	1.38	1.48	29.34	31.57
Mean			28.11	30.63	1.66	1.73	5.54	5.26	1.26	1.35	26.86	28.46
Mean for "B"		$10m^3$/fed	22.36	24.55	1.39	1.47	5.19	4.90	1.05	1.13	20.85	22.08
		$20m^3$/fed	28.57	31.03	1.69	1.76	5.89	5.51	1.28	1.35	27.72	29.30
Mean for "C"		Low	23.49	25.35	1.47	1.54	5.26	4.78	1.08	1.17	21.96	24.35
		Medium	27.16	30.11	1.63	1.71	5.82	5.50	1.24	1.32	27.00	27.97
		High	25.75	27.91	1.53	1.60	5.31	5.33	1.16	1.24	23.89	26.03
L.S.D at (0.05) for :												
Manure source		A	3.223	3.709	0.138	N.S	0.370	0.305	0.071	N.S	2.483	2.133
Manure levels		B	1.482	1.822	0.094	0.119	0.240	0.346	0.030	0.073	1.785	1.362
Natural rocks		C	1.963	1.651	0.089	0.113	0.243	0.250	0.087	0.081	1.400	1.910
Interactions		AB	N.S	N.S	0.108	N.S	N.S	N.S	0.052	N.S	2.100	N.S
		AC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
		BC	N.S	N.S	N.S	0.102	N.S	N.S	N.S	N.S	N.S	1.753
		ABC	N.S	N.S	N.S	0.278	N.S	N.S	N.S	N.S	N.S	N.S

The highest mean values produced by plants which fertilized with manure level at of 20 m^3/fed.The improvement of soil properties due to manuring, consequently increased nutrients availability in soil and its absorption. These results are quite similar to those reported by Tamayo and Munoz (1996); Alves (1999); Venturini *et al*. (2005); Ferreira *et al.* (2010) and Scherer (2011) on beans, they indicated that application of organic manure enhanced seed yield and its components.

It is also obvious from the data in Tables (6 and 7) that using natural fertilizers produced significant increase in seed yield and its components in the two growing seasons.

Table (7): Effect of sheep and farmyard manures, rock phosphate plus feldspar on dry seed yield, N, protein, phosphorus and potassium percentages in the seeds of common bean during 2011 and 2012 seasons.

Manure sources "A"	Manure levels m^3/fed "B"	Natural rocks kg/ fed "C"	Dry seed yield (ton/fed)		N %		Protein %		P %		K %	
			2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Sheep manure (SM)	10	Low	0.375	0.419	3.33	3.36	20.81	21.73	0.22	0.19	1.46	1.57
		Medium	0.503	0.566	3.42	3.47	21.37	22.28	0.24	0.22	1.69	1.86
		High	0.469	0.543	3.53	3.59	22.04	22.72	0.26	0.24	1.85	2.00
	20	Low	0.530	0.601	3.61	3.79	22.59	23.51	0.27	0.25	2.22	2.48
		Medium	0.645	0.704	3.75	3.80	23.45	23.73	0.29	0.27	2.30	2.70
		High	0.613	0.657	3.83	3.96	23.95	24.75	0.30	0.29	2.72	2.88
Mean			0.523	0.582	3.58	3.66	22.37	23.12	0.26	0.25	2.04	2.25
Farmyard manure (FYM)	10	Low	0.324	0.376	2.96	3.10	18.51	19.95	0.19	0.16	1.40	1.35
		Medium	0.388	0.422	3.12	3.27	19.53	20.42	0.21	0.18	1.49	1.54
		High	0.351	0.403	3.23	3.34	20.17	20.89	0.22	0.21	1.58	1.61
	20	Low	0.510	0.552	3.37	3.56	21.09	22.26	0.23	0.20	1.60	1.68
		Medium	0.576	0.659	3.53	3.67	22.08	22.92	0.25	0.23	1.79	1.92
		High	0.545	0.634	3.64	3.69	22.73	23.06	0.28	0.25	1.98	2.15
Mean			0.449	0.508	3.31	3.44	20.69	21.58	0.23	0.21	1.64	1.71
Mixture (SM+ FYM)	10	Low	0.482	0.523	3.15	3.29	19.67	20.54	0.20	0.18	1.38	1.52
		Medium	0.557	0.597	3.26	3.35	20.36	21.27	0.21	0.20	1.54	1.71
		High	0.529	0.576	3.41	3.44	21.34	21.79	0.24	0.22	1.72	2.11
	20	Low	0.593	0.642	3.52	3.62	22.03	22.61	0.25	0.23	1.94	2.22
		Medium	0.726	0.726	3.67	3.74	22.95	23.39	0.27	0.25	2.23	2.53
		High	0.689	0.690	3.70	3.85	23.39	24.09	0.29	0.27	2.43	2.67
Mean			0.596	0.626	3.45	3.55	21.62	22.28	0.24	0.23	1.88	2.13
Mean for "B"		$10m^3$/fed	0.442	0.492	3.27	3.36	20.42	21.29	0.22	0.20	1.57	1.70
		$20m^3$/fed	0.603	0.651	3.63	3.74	22.70	22.37	0.27	0.25	2.14	2.36
Mean for "C"		Low	0.469	0.519	3.33	3.45	20.78	21.75	0.23	0.20	1.67	1.80
		Medium	0.566	0.612	3.46	3.55	21.62	22.34	0.25	0.23	1.84	2.04
		High	0.533	0.584	3.56	3.65	22.27	22.88	0.27	0.25	2.05	2.24
L.S.D at (0.05) for :												
Manure source		A	0.101	0.051	0.170	N.S	1.105	N.S	0.021	0.019	0.120	0.376
Manure levels		B	0.056	0.040	0.314	0.240	1.942	1.571	0.019	0.011	0.203	0.265
Natural rocks		C	0.045	0.062	0.111	0.084	0.692	0.478	0.013	0.006	0.162	0.173
Interactions		AB	N.S	0.058	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
		AC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
		BC	0.048	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
		ABC	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Plants fertilized with rock phosphate combined with feldspar at the rate of $30P_2O_5$ + $50K_2O$ kg /fed gave the highest values of number of pods per plant, dry pod weight , number of seeds per dry pod, seeds weight per pod, weight of 100 - seeds and seed yield. The promotive effect of natural fertilizers on seed yield may be due to its effect on improve the soil physical, chemical properties, as well as increased water uptake and nutrient availability, in turn increased seed yield (Eman, 2010). These results were in accordance with these mentioned by Dwivedi *et al*. (1995); Rodriguez and Herrera (2002); Ogut *et al*. (2005) and Ndakidemi (2007) indicated that addition of Minjingu phosphate rock at the rate of 26 kg p/ha combined with tughutu significantly produced higher seed yield of beans. Also, Ezzat *et al*. (2005) on lentil and Hassan (2010) on Khella, added also that application of feldspar at 226 kg/fed or recommended doses

of potassium gave the best weight of herb dry, the number of umbels/plant and seed yield.

Regarding the effect of interaction treatments, the data in Table (6 and 7) indicated that the interaction between sheep manure + farmyard manure and manure level at 20 m^3/fed markedly increased dry pod weight, weight of seeds per pod and weight of 100- seeds in the first season and also it increased seed yield in the second season, where manure level at 20 m^3/fed + natural fertilizers at the rate of $30P_2O_5$ plus $50K_2O$ kg/fed produced greater dry pod weight and weight of 100-seeds in the second season, and gave the highest dry seed yield in the first season. The combination treatment of sheep manure + farmyard manure plus manure level at 20 m^3/fed and rock phosphate combined with feldspar at the rate of $30P_2O_5$ + $50K_2O$ kg/fed was the most effective treatment, since it recorded the highest dry pod weight in the second season. These results are in harmony with those obtained by Aery et al (2004) on wheat, chickpea and cluster bean; Helall *et al*. (2009) on faba bean and Ghada (2012) on zea maize. Helall *et al*. (2009) on faba bean, found that addition of town refuses combined with rock phosphate and feldspar increased seed yield. On the other hand, all interactions had insignificant effects on number of pods per plant and number of seeds per pod in both growing seasons.

E- Chemical analysis of seeds:

Data of nitrogen, protein, phosphorus and potassium percentages in seeds as affected by manure sources are presented in Table (7) the data revealed that the applying of sheep manure produced the highest N% and protein % as compared to farmyard manure in the first season, also it recorded the highest P% and K% in the two growing seasons. Manure levels markedly increased N, protein, P and K contents in seeds in the two growing seasons. Chemical compositions were improved by manure level at 20 m^3/fed. The increment of chemical composition owing to sheep manure may be due to the increase of nutrients availability in soil through improving its conditions, especially soil pH. Many authors reported these finding such as Gaber (2000); Warman (2005); Lalljee (2006) and Shehata (2011) they mentioned that addition organic manure increased N, protein, P and K contents of beans.

Results in Table (7) declared that plants fertilized with rock phosphate plus feldspar at the rate of $45P_2O_5$ + 75KOkg/fed increased N, protein, P and K contents in the two growing seasons. Such response to rock phosphate and feldspar was reported by Garica (1997); Rodriguez and Herrera (2002); Ogut *et al*. (2005) on beans for rock phosphate. Also, Ezzat *et al*. (2005) on Lentil; Seddik (2006) on peanut and Abd El-lattif (2007) on faba bean for feldspar. Helall *et al.* (2009) on faba bean and El- Henfy and Yossef (2011) for rock phosphate plus feldspar, who added also that application of rock phosphate and feldspar at the rate of $45P_2O_5$ and $96K_2O$ kg/fed enhanced chemical composition of onion. Data in Table (7) showed that all interactions did not show any significantly effect on chemical constituents in both seasons.

Accordingly, from the foregoing results, it could concluded that application of sheep manure + farmyard manure at 20m^3/fed and fertilization with rock phosphate combined with feldspar at the rate of 30 P_2O_5 + $50K_2O$ kg/fed were the favorable

treatment to obtain the maximum green pod, seed yields and high quality of common bean cv. "Bronco" may be recommended.

References:

Abd El-Lattif, K.M. (2007). Improving the efficiency of potassium fertilization in some Egyptian soils. Ph.D. thesis , Fac. Of Agric., Al- Azhar Univ., Egypt.

Abubaker, S.; Y. Al- Zubi ; M. Kasrawi and A. Aburayyan (2008). Yield and quality of plastic house snap bean (*Phaseolus vulgaris* L.) produced by conventional, organic and good agricultural practices (GAP) in the Jordan valley. Acta Horticulturae, 797: 399- 410.

Aery, N.C.; D.M.R. Sekhar; D.K. Rana and K.A. Sangeet (2004). Studies on the use of high grade rock phosphate as a direct "P" fertilizer in neutral and weakly alkaline soils. Phosphate rich organic manure on alternative to phosphate fertilizers, 11-22.

Alves, E.U.; A.P. de Oliverira; R. de L. A. Bruno; J.A. L. da Silva and E.P. Goncalves (1999). Productivity evaluation and seed quality of snap bean cultivated with organic matter. Revista Brasileira de Sementes, 21(2): 232- 237.

A.O.A.C. (1970). Association of Official Agriculture Chemists, Washington DC, 11th Ed.

Aryal, U.K.; H.L. Xu and M. Fujita (2003). Rhizobia and AM Fungal inoculation improve growth and nutrient uptake of bean plants under organic fertilization. Journal of Sustainable Agriculture, 21(3) : 29- 41.

Badr, M.A. (2006). Efficiency of K - feldspar combined with organic materials and silicate dissolving bacteria on tomato yield. J. Appl. Sci. Res., 2 (12) : 1191- 1198.

Brougham, B. W. (1960). The relationship between the critical leaf area, total chlorophyll content and maximum growth rate of some pasture and crop plants. Ann. Bot. 24, 463.

Chapman, H.D. and P.F. Paratt (1978). Methods of Analysis for soil, plant and waters. Univ. California, Div. Agric. , Sci., 17, 150.

Dwivedi, G.K. (1995). Agronomic effectiveness of partially acidulated lalitpur rock phosphorus in an acid Inceptisol. Journal of the Indian Science, 43 (2): 231- 236.

El-Henfy, E.M. and S.B.D. Youssef (2011). Productivity improvement of onion (Allium cepa L.) using natural fertilizers of phosphorus and potassium under South Sini conditions. Bull. Fac. Agric., Cairo University, 62: 71- 80.

El- Kina, G. Y. and T.P. Konstantinova (1998). The effect of large applications of organic fertilizers on ameliorated podzolic soils. Agrokhimiya. (5) : 68-75.

Eman, S.A.; W.M. Abd El- Messeih and G.B. Mikhael (2010) . Using of natural raw material mixture and magnetite raw (magnetite iron) as substitute for chemical fertilizers in feeding "Le Conte" pear trees planted in calcareous soil. Alex. Sci. Exchange J., 31(1) : 51- 62.

Ezzat, Z.M.; K.M. Khalil and A.A. Khalil (2005). Effect of natural potassium fertilizer on yield, yield components and seed composition of lentil in old and new reclaimed lands. Egypt, J. Appl. Sci., 20 (2) : 80- 92.

Ferreira, A.O.; J.C.M. Sa ; O.G. Nascimento; C. Briedis and F.S. Ramos (2010). Impact of organic waste from poultry slaughter pigs and the yield of

beans in the region of Campos Gerais. Revista verde de Agroecologia e Desenvolvimento Sustentavel, 5 (4) : 15- 21.

Gaber, S.M. (2000) . Effect of some organic fertilizers on growth, yield and quality of some new snap bean cultivars (*Phaseolus vulgaris* L.). Alexandria Journal of Agricultural Research, 45 (2) : 201- 212.

Gardner, L.R. (1983) . Mechanisms and kinetics of incongruent feldspar dissolution. Geol., 11: 418- 421.

Garica, A.; A. Nuviola and M. Aguilera (1997). Evaluation of natural and modified rock phosphate from the Trinidad de Guedes de posits. Agrotecnia de Cuba, 27 (1): 50- 54.

Ghada, F.H. E. (2012). Minmizing pollution with inorganic fertilizers through some nutritional techniques. Ph. D. Thesis, Fac. Of Agric., Banha, Univ., Egypt

Gowda, A.M. ; A.A. Taweel and K.B. Eassa (2011). Studies on reducing the harmful effect of saline water irrigation on picual olive trees. Minufiya J. Agric. Res., 36 (3): 623- 645.

Hassan, E. A. and E. H. Hamad (2010). Microbial solubilizing of phosphate - potassium rocks and their effect on khella (*Ammivisnaga*) growth. Annals Agric., Sci., Ain Shams Univ., Cairo, 55 (1) : 37-53.

Hellal, F.A.; M.A. El- Hady and A.A. M. Ragab (2009). Influence of organic amendments on nutrient availability and uptake by faba bean plants fertilized by rock phosphate and feldspar. American-Eurasian journal of Agricultural and Environmental Science, 6 (3): 271- 279.

Jackson, M. L. (1958). Soil Chemical Analysis Constable ? Co. Ltd., London.

Lalljee, B. (2006). Effect of two commercially available compost on soil properties and yield and mineral content of bean (*phaseolus vulgaris*). Revue Agricole at Sucriere de 1 I le Maurice, 85 (1/2/3): 75- 83.

Lunazendejas, H. S.; M. Solis Oba; W. Lopez Wong; A. Vera Reyes and J.M. Gonzalez Prieto (2011). Effect of compost made with sludge and organic residues on bean (*Phaseolus vulgaris* L.) crop and arbuscular myccorrhizal fungi density. African Journal of Agricultural Research, 6 (6) : 1580- 1585.

Magda, M.H. and R.M. Asmaa (2004). Response of snap bean (*Phaseolus vulgaris* L.) to nitrogen fertilizer source - Annals of Agricultural Science, Moshtohor, 42 (1) : 261- 270.

Manjunath, M.N.; P.L. Patil and S.K. Gali (2006). Effect of organic-amended rock phosphate and P - solubilizer on growth, yield and quality of French bean under vertisol of Malaprabha command of north Karnataka . Karnataka Journal of Agricultural Sciences, 19 (1): 30- 35.

Manning, D.A.C. (2010). Mineral sources of potassium for plant nutrition. Areview article. Agronomy for sustainable develop. 30: 208- 294.

Massoud, O.N.; E.M. Morsy and N.H. El - Batanony (2009). Field response of snap bean (*Phaseolus vulgaris* L.) to N_2 – fixers Bacillus circulans and Arbycular myccorrhizal fungi inoculation through accelerating rock phosphate and feldspar weathering. Australian J. Basic and Appl. Sci., 3 (2): 844- 852.

Masanta, S. and Biswas (2009). Effect of various nutrient management practices on productivity, soil fertility status and water use efficiency of French bean grown under homestead condition in Nadia district of West Bengal. Journal of Crop and Weed, 5 (2) : 50- 52.

Nachimuthu, G. ; P. Lockwood; C. Guppy and P. Kristiamsen (2009). Phosphorus uptake in faba bean, field pea and corn cultivars from different sources: preliminary studies of two options for organic farmers (Special Issue: Low P farming systems.) .Crop & Pasture Science, 60 (2): 183- 189.

Nawalagatti, C. M.; G.N. Ashwini ; M.B. Doddamani; M.B. Chetti and S. M. Hiremath (2009). Influence of organics, nutrients and plant growth regulators on growth, yield and yield components in French bean. International Journal of plant Sciences (Muzaffarnagar), 4 (2): 367- 372.

Ndakidemi, P.A. (2007). Agronomic and economic potential of Tughutu and Minjingu phosphate rock as alternative phosphorus sources for bean growers. Pedosphere, 17 (6): 732- 738.

Ndung'u , K.W.; J.R. Okalebo; C.O.Othieno; M.V. Kifuko; A. K. Kipkoech and L.N. Kimenye (2006). Residual effectiveness of Minjingu phosphate and fallow biomass on crop yields and financial returns in West Kenya. Experimental Agriculture, 42 (3) : 323- 336.

Nekesa, P.; H. K. Maritim; J. R. Okalebo and P.L. Woomer (1999). Economic analysis of maize- bean production using a soil fertility replenishment product (PREP- PAC) in western Kenya. African Crop Science Journal, 7 (4): 585- 590.

Ogut, M.; C. Akdag; O. Duzdemir and M.A. Sakin (2005). Single and double inoculation with Azospirillum / Trichoderma : the effects on dry bean an wheat. Biology and Fertility of soils, 41(4) : 262- 272.

Olfati, J.A. ; S.A. Khasmakhi- Sabet ; H. Shabani and G. Peyvast (2012). Alternative organic fertilizer to cow manure for French dwarf bean production. International Journal of Vegetable Science, 18 (2): 190- 198.

Rajan, S.S.S.; J.H. Watkinson and A.G. Sinclair (1996). Phosphate rock for direct application to soils. Adv. Agron., 57: 77- 159.

Ramos, S.J. ; D. S. Alves; L. A. Fernandes and C.A. da Costa (2009). Yield of bean plant and changes in PH and soil organic matter as a function of doses of compost cotton waste. Ciencia Rural, 39 (5) : 1572- 1576.

Ranganna, S. (1978). Manual of analysis of fruit and vegetable products Tata MC Graw- Hill Publishing company. Limited. New Delhi. 2nd reprint.

Rhoads, F.M. ; S. M. Olson (1995). Crop production with mushroom compost. Proceedings-Soil and crop Science Society of Florida, 54: 53- 57.

Rodriguez, R. and J. Herrera (2002). Field evaluation of partially acidulaled phosphate rocks in a ferralsol from Cuba (Special Issue: Utilisation of phosphate rocks to improve soil P status for sustainable crop production in acid soils). Nutrient Cycling in Agroecsystems, 63 (1) : 21- 26.

Satpal, S. and K.K. Kapoor (2000). Influence of inoculation of different vesicular arbuscular mycorrhiza fungi on growth and

nutrient of mung bean and wheat. Philippine Journal of Science, 129 (1): 19- 25.

Scherer, E.E. (2011). Effects of organic manure and compost sources on corn and common bean production in organic farming system under no- till management. Agropecuaria Catarinense, 24 (2): 60- 64.

Seddik, W. M. A. (2006). Effect of organic manures and feldspar application on some sandy soil physical and chemical properties and their reflection on peanut productivity. J. Agric., Sci., Mansoura Univ., 31(10): 6675- 6687.

Shanmugam, P.M. (2008). Production potential and economics of pigeon pea (*Cajanus cajan*) based intercropping system with different levels and forms of P. Journal of farming Systems Research & Development, 14(1): 118- 122.

Shehata, S.A.; Y. M. Ahmed; E.A. Shalaby and O.S. Darwish (2011). Influence of compost rates and application time on growth, yield and chemical composition of snap bean (*Phaseolus vulgaris* L.). Australian Journal of Basic and Applied Science, 5 (9) : 530- 536.

Singer, S.M.; O.M. Sawan; M.M. Abdel- Mouty and S.R. Salman (1999). Studies on the effect of Delta mix TM and organic matter on growth and productivity of bean plants. Acta Horticulturae, 491: 253- 260.

Sisworo, E.L.;H. Rasjid; W. M. Sisworo; haryanto and K. Idris (2002). Direct use of phosphate rock to improve crop production in Indonesia. International atomic Energy Agency Technical Documents (IAEA- TEC-DOC$_S$), 1272: 275- 293.

Steel, R.G. D. and J.H. Torrie (1980): Principles and procedures of statistics, Abiometrical approach. Mc Graw- Hill Book Comp. N.Y., U.S.A.

Tamayo, V.A.; A. R. Munoz (1996). Application of organic and mineral fertilizers to beans (*Phaseolus vulgaris*) on alluvial soils in amild climate. Actualidades Corpoica, 10 (107) : 10- 13.

Teixeira, N.T.; L.B. Botezelli ; E.B. Galatti; M.S. Santos; F. M. Alves; D. Z. Soares; D.Z. Bruins; M.G. da, Cruz and J.F. Basilli (2008). Beans culture production in the organic fertilizing. Ecossistema, 33 (1/2): 35- 38.

Venturini, S.F.; Z.I. Antoniolli; R.B. Steffen; E.F. Venturini and E.M.N. Giracca (2005). Effects of vermicomposting, nitrogen fertilization and inoculation with (*Rhizobium phaseoli*) in common bean. revista de Ciencias Agroveterinarias, 4 (1): 52- 59.

Wallace, D.H. and H.M. Munger (1965). Studies of the physiological basis for yield differences, I – growth analysis of six dry bean varieties. Crop Sci., 5, 343.

Warman, P.R. (2005). Soil fertility, yield and nutrient contents of vegetable crops after 12 years of compost or fertilizer amendments. Biological Agriculture & Horticulture, 23 (1) : 85-96.

Youssef, A. M.; A. H. M. El-fouly; M. S. Youssef and S. A. Mohamedien (2001).Effect of using organic and chemical fertilizers in fertigation system on yield and fruit quality of tomato. Egypt. J. Hot.28:59-77.

تأثير التسميد العضوى والتداخل بين صخر الفوسفات والفلسبار على النمو والمحصول ومكونات المحصول فى الفاصوليا.

عبد الجواد محمد احمد احمد ، ربيع حسن محمد غيث ، رأفت محمد جلال

أقسام بحوث الخضر بالدقى – معهد بحوث البساتين – مركز البحوث الزراعية الجيزة– مصر

أجريت دراسة حقلية بمزرعة محطة بحوث البساتين بسدس – بنى سويف خلال الموسمين النيلى لعام 2011، 2012 بهدف دراسة تأثير التسميد العضوى بواسطة سماد الاغنام والسماد البلدى والخلط بينهما بنسبة (1 : 1) وبالمعدلات 10، 20م^3 / الفدان وكذلك التسميد بخام صخر الفوسفات والفلسبار بمعدلات (15 كجم فو$_2$أ$_5$ + 25 بو$_2$أ ، 30 كجم فو$_2$أ$_5$ + 50كجم بو$_2$أ ، 45 كجم فو$_2$أ$_5$ + 75كجم بو$_2$أ) / الفدان على النمو ومحتوى الأوراق من الكلورفيل وكذلك البروتين والألياف فى القرون الخضراء والمحصول الأخضر والبذور الجافة ومكوناتها ومحتوى البذور الجافة من النيتروجين والبروتين والفوسفور والبوتاسيوم فى صنف الفاصوليا " برونكو ".

وأوضحت نتائج الدراسة ان مصادر التسميد العضوى لم يكن لها تأثير معنوى على صفة طول النبات ومحتوى الأوراق من الكلورفيل خلال موسمى الزراعة. سماد الاغنام زاد معنويا عدد الأفرع ، النسبة المئوية للبروتين فى القرون الخضراء ، طول القرن ، عدد بذور القرن الجاف ومحتوى البذور من الفوسفور والبوتاسيوم خلال الموسمين . كذلك زاد معنويا مساحة سطح الورقة فى الموسم الثانى وكذلك محتوى البذور الجافة من النيتروجين والبروتين فى الموسم الأول . كذلك السماد البلدى ادى الى زيادة معنوية فى النسبة المئوية للالياف فى القرون الخضراء خلال موسمى الزراعة. وادى أيضا الخلط بين سماد الأغنام والسماد البلدى الى زيادة معنوية فى الوزن الجاف للنبات ، قطر ووزن القرن الأخضر والمحصول الأخضر وعدد القرون / النبات ووزن الـ 100 بذرة ومحصول البذور الجافة خلال موسمى الزراعة. بينما زاد وزن القرن الجاف ووزن بذور القرن الجاف فى الموسم الأول .

أدى التسميد العضوى بالمعدل 20م ^{3} / الفدان إلى زيادة معنوية فى جميع صفات النمو الخضرى ومحتوى الأوراق من الكلورفيل ومحتوى القرون الخضراء من البروتين والمحصول الأخضر ومحصول البذور الجافة ومكوناتها ومحتوى البذور الجافة من النيتروجين والبروتين والفوسفور والبوتاسيوم خلال موسمى الزراعة. من ناحية أخرى كان المعدل 10م^3/ الفدان زاد معنويا النسبة المئوية للألياف فى القرون الخضراء خلال موسمى الزراعة.

أدى التسميد بخام صخر الفوسفات والفلسبار بالمعدل العالى (45 كجم فو$_2$أ$_5$ + 75كجم بو$_2$أ) / الفدان إلى زيادة معنوية فى صفة طول النبات وعدد الأفرع ومساحة سطح الورقة ، النسبة المئوية للبروتين والألياف فى القرون الخضراء والنسبة المئوية للنيتروجين والبروتين والفوسفور والبوتاسيوم فى البذور الجافة خلال موسمى الزراعة. بينما التسميد بالمعدل المتوسط (30كجم فو$_2$أ$_5$ + 50كجم بو$_2$أ)/ الفدان أدى إلى زيادة معنوية فى صفة الوزن الجاف للنبات ، الكلورفيل والمحصول الأخضر ومحصول البذور الجافة ومكوناتها خلال موسمى الزراعة.

بناء على ما سبق يمكن التوصية بتسميد الفاصوليا صنف " برونكو" بسماد الأغنام+ سماد المواشى بالمعدل 20 م^3/ الفدان (من اجمالى الخلط بين السمادين) والتسميد بخام صخر الفوسفات والفلسبار بالمعدل 30 كجم فو$_2$أ$_5$ + 50كجم بو$_2$أ/ الفدان لانتاج محصول عالى من القرون الخضراء والبذور الجافة مع الجودة العالية.