Middle East Journal of Applied Sciences
ISSN 2077-4613

Volume : 07 | Issue :04 |Oct.-Dec.| 2017
Pages: 703-712

The Potential of different levels of compost manure and usage of potassium foliar spraying on growth, yield and seed chemical build of broad bean plant

Shafeek M. R., Asmaa R. Mahmoud, Aisha H. Ali, Y. I. Helmy and Nadia M. Omar

Vegetable Res. Dept., National Research Centre, Dokki, Giza, Egypt.

Received: 14 August 2017 / Accepted: 30 Sept. 2017 / Publication date: 19 Oct. 2017

ABSTRACT

Two farming experimentation were achieved in the empirically station of National Research Centre at Nubaria, Behira Governorate, Egypt during the two winter seasons of 2014/2015 and 2015/2016 to investigator the activity of different standard of compost fertilization (0, 10 and 20 m^3\ fed.) of Nile compost with foliar implementation of potassium thiosulfat (KTS) at (1 %) and (2%) and without potassium (control) and their interaction on growth and total yield of broad bean plant cv. “Koprosay". Nile compost fertilizer it was put down before seeding was used. Potassium foliar addition was made 3 times at 15 day's period during the growing interval (15, 30 and 45 days after seeding). The obtained results presentation that: 1-Increased the level of compost fertilization rate (20 m^3\ fed.) accord the tallest plant, the highest number of leaves per plant and the considerable fresh and dry weight of plants as well as the big total pods yield (ton / fed.). Also, the acquired effect report that the pods menstruation i.e. (number, length and weight) as well as seeds chemical structure (N, P, K and protein). 2- Spraying broad bean plants with potassium thiosulfate at a rate of (2%) markedly improved vegetative growth, total pods yield, pods quality and seeds chemical texture. 3- Growth, total yield, pods parameters and seeds chemical build were obtained when broad bean plants by soil fertilized with (20 m^3\fed.) with foliar employment of potassium thiosulfate at (2%).

Key words: Broad bean, compost fertilizer, foliar potassium thiosulfate (KTS), growth, total pods yield, seed quality.

Introduction

In most improve area, broad bean are overwhelminglyan perfect part of agrarian environment. Broad bean (*Vicia faba* L.) c.v Koprosay is one of generality major legumes in Mediterranean agrarian zone. In Egypt it is used in great equal as human food and it is cultivated in crop rotations to improve soil estate (Jasim, 2007).

Compost manure improves chemical, physical and physiochemical property of soil. Also, excrescent contain of inorganic fertilizers are used to vegetables in order to fulfill a higher yield (Stewart *et al.,* 2005) and maximum amount of growth, (Dauda *et al.,* 2008). However, the use of inorganic fertilizers alone may reason problems for human health and the environment (Arisha and Bardisi, 1999). Compost manure can avail as alternative training to mineral fertilizers (Naeem *et al.,* 2006) for improving soil structure and microbial biomass (Suresh *et al*., 2004). Moreover, these changes improve soil physical structure and water holding capacity, resulting in more extensive root development and enhanced soil micro flora and fauna activity, all of which can affect the levels of micronutrients available to plants (Zeidan, 2007). The best means of maintaining soil fertility and productivity could be through periodic addition of organic materials either alone or in addition to mineral fertilizers. However, Shafeek, *et al* (2003) reported that, the best plant growth parameters (length of plant, number of leaves and fresh and dry weight of whole plant and its different organs, all of them were associated with addition organic nitrogen at rate 60 kg N/ fed. also the heaviest bulbs yield and the gloves tissues content of minerals were correlated with organic manure addition to promote plant growth with compost extract the extract must be derived from compost that also promotes plant growth (Shrestha *et al.,*2011). However, Abou El-Magd *et al.,* (2012) reported that vegetative growth parameters, plant length, leaf number and fresh and dry weight of leaves as well as total yield and its quality (bulb weight and marketable yield) of garlic plants were used to evaluate the

Corresponding Author: Shafeek M.R., Vegetable Res. Dept., National Research Centre, Dokki, Giza, Egypt.

various organic material. Other authors added that, organic manures fertilizers are slow release forms of nitrogen where natural organic materials are broken down slowly by the soil microorganisms (Shafeek *et al* 2003). In the same respect, Hassan (2015) found that compost manure treatment recorded the highest values of the plant height, number of leaves per plant and fresh as well as dry weight of whole plant, chemical composition and yield of garlic plants. Also the high maximum bulb weight clove weight and total fresh yield, it could be recommended to use compost manure at high level. However, Shafeek, *et al* (2015) found that increasing the levels of compost manure significantly increased plant growth, fruit yield, physical and chemical characters of fruit quality of cantaloupe plants. Many investigators studied the effect of compost fertilization on growth of bean plants (Stewart *et al.,* 2005 and Rafaat *et al* 2016).

Nowadays, potassium foliar application becomes a substantial operator for broad bean plants production under Egyptian soils. However, farmers reduce the used amount to the minimum dosage or ignored using it because chemical potassium fertilizer became a high costly fertilizer in Egypt. In supplement use any other newly and frugal potassium source through foliar application to conquer such problem and to maximize their grid returning to cover the additional cost of this K fertilizer provenance. Foliar fertilization is further frugal than soil fertilization due to the competence and minimizes cost. The foliar mode of fertilizer application is commonly outshined because very little amounts of fertilizers are utilized per hectare. It also decreases the number of push through of the demand, that way reducing problem of soil density. Foliar application is also minimal probable to effect in ground water pollution. John *et al* (2011) reported that foliar K thiosulfate (KTS) treatments achieve in higher plant tissue K levels, higher soluble solids levels, total sugars, and bioactive synthesis (ascorbic acid and β-carotene) on cantaloupe fruits. However, foliar spraying of K thiosulfate has been attached with increased yields, fruit size, improved soluble solids and ascorbic acid levels, improved fruit color, increased shelf life, and shipping quality of much horticultural crops Lester *et al* (2005 and2006). However, foliar implementation of potassium increased the growth and yield of vegetable plants El-Tohamy *et al* (2011). Potassium in organic cheated form (potassium borate citrate and Humate) can be used as an frugal source for potassium and it could be used as foliar application. Moreover, it was reported by many investigators that they increased the plant growth, nutrient uptake and plant yield as well as quality Fathy and El-Hamady (2007). However, (Awatef, *et al* 2015) reported that spraying onion plants with potassium thiosulfate at a rate of (2L\fed.) markedly increased plant growth, yield, and bulb quality as well as bulb chemical synthesis. Also, the favorable effects of the potassium on the growth, total yield and bulb parameters were obtained when onion plants fertilized with 300 kg /fed. as potassium sulfate plus high level of foliar application of potassium thiosulfate (2 L\fed.).

Materials and Methods

This study was carried out at the experimental station of the National Research Centre, Beheira Governorate (north of Egypt), during the two winter season of 2015 and 2016 to investigate the effect of different levels of organic manure Nile compost (10 and 20 m^3\fed.) with foliar application of different level of potassium thiosulfate at rate of (1 and 2 L\ fed)for influence plant growth, total yield and its components as well as nutrition value of seeds in broad bean plants (*Vicia faba* L) c.v. Koprosay. However, Nile compost used in this study was obtained from Egyptian Company for Agricultural Residues Utilization (ECARU). Physical and chemical properties of Nile compost are shown in Table (1). The experimental site had a sandy soil texture with pH of 7.6, EC of 1.9 and the organic matter was 0.21% with 14.00, 8.90 and 15.60mg/100g soil of N, P and K, respectively.

Every experiment included 9 treatments which were the combinations between two levels of organic manure (Nile compost) at rate of (10 m^3/fed and 20 m^3/fed.) plus control treatment without compost fertilizer with foliar spray of two levels of potassium (thiosulfate) at rate of (1 and 2 L\ fed) plus control treatment (foliar spraying with water).Broad bean seeds were sown on 15 and 22 of October in 2015 and 2016 seasons respectively. The experimental design was split plot with 3 replications, where compost treatments were assigned in the main plots and potassium foliar application treatments were devoted within the subplots. The experimental plot area was 10.5 m^2 and included5 rows (each was 3.5m length and 60 cm width) and the distance between plants was 10 cm. The normal cultural practices i.e. irrigation, fertilizer and pest control for the broad bean plant

productions were followed. The organic fertilizer (Nile compost) was added before sowing date. However, foliar spraying of potassium (thiosulfate) was achieved after 20 days from sowing date, every 10 day's intervals for three times. Plant samples were taken 60days after sowing where five plants were chosen from each sub plot and the following data were recorded: plant length (cm), number of leaves per plant, fresh and dry weight of leaves and shoots as g/ plant. Yield of each sub plot was weighed and expressed as tons per fed. and for the some physical properties of broad bean pods samples of 20 pods were taken from each experimental plot and length (cm), weight (g),number of pods/ plant and number of seeds/pod were recorded. At the same time, chemical analysis i.e. the percentage of N, P and k contents in dry seeds were determined according to the methods of Pregl, (1945),Trough, and Meyer, (1939) and Brown and Lilleland (1964)respectively. But the percentage of crude protein was determined according to AOAC,(1975).

All obtained data were subjected to the statistical analysis and means were compared according to LSD at 5% level test described by Gomez and Gomez (1984).

Table 1: Physical and chemical properties of Nile compost used in this study.

Compost properties	Values
Density as wet basis (kg/m3)	600 - 750
Density as dry basis (kg/m3)	450 - 560
Moisture content (%)	25 - 30
pH in 1 : 10 extract	5.5 - 7.5
EC in 1 : 10 extract (dS/m)	3.5 - 5.5
Water holding capacity (%)	200 - 300
Organic matter (%)	40 - 45
Organic carbon (%)	23.2 - 26.1
C/N ratio	14.5 : 1 - 16.5 : 1
Total nitrogen (%)	1.4 - 1.8
Phosphorus (%)	0.4 - 0.8
Potassium (%)	0.6 - 1.2
Iron (ppm)	1500 - 2000
Copper (ppm)	160 - 240
Manganese (ppm)	100 - 150
Zinc (ppm)	40 - 80

Source: Egyptian company for agricultural residues utilization (ECARU).

Results and Discussion

A- Growth characters:

1-Effect of Nile compost levels:

Data in Table (2) showed clearly that increasing the level of Nile compost from 10 to 20m^3/fed. improved all vegetative growth characters of broad bean plants. A significant increase in the vegetative growth was realized in plant length, number of leaves per plant as well as fresh and dry weight of leaves and stems, when Nile compost level increased from 10 to 20m^3/fed. It could be concluded that, the higher level of organic manure (compos) had a positive effect on broad bean plant growth. The increment of bean plant dry weight of leaves by application of higher level of Nile compost (20 m^3/fed.) amounted by 9.17 % compared with lower level (10 m^3/fed.) and 24.24 % compared without compost. The superiority in the vegetative growth by the higher level of organic manure might be attributed to its favorable effect on the physical characters of the soil (Marculescu *et al*., 2002 and Ozores-Hampton *et al.,* 2011) or dueto the slow release of nutrients (Eissa, 1996). The obtained results are in good agreement with Jimenez *et al.* (1997); El-Desuki*et al.* (2000); Sarhan *et al.* (2011), Ozores-Hampton (2012) and Shafeek, *et al* (2015).

2-Effect of potassium foliar application:

Concerning potassium foliar implementation treatments had a significant effect on growth characters (plant length, number of leaves/ plant, fresh and dry weight of leaves and stems per plant)

in both seasons (Table 2). However, spraying broad bean plants with the high standard of potassium thiosolfate (2 L\ fed.) generated the highest values of growth parameters follow by spraying plants with lower grade (1 L\ fed.) in both seasons; while control treatment (without potassium foliar application) accord the minimum values of these characters in both seasons. The excellence of plant growth with the supplement of potassium thiosulphate (KTS) might be referring to besides the role of potassium in protein synthesis, nutrients translocation, anti oxidant enzymes, root proliferation and leaves growth (Chen *et al.*, 2004). The most growth promote effect of potassium thiosulphatemay be due to that this formularization consist of K and S of the similar and consistent synergetic business, complexes with organic moiety, ensuring potent K and S nutrition for more increase of carbohydrates, proteins, enzymes and energy synthesis (Marschner, 1995).

Table 2: Effect of different levels of compost and foliar application of potassium fertilizer of growth characters of broad bean plant during 2015 and 2016 seasons.

Compost levels	Foliar spray of potassium	Plant length (cm)	Number of leaves/plant	Fresh weight (g)		Dry weight (g)	
Without				Leaves	Stem	Leaves	Stem
	Second season 2015						
	without	13.17	13.00	16.04	13.97	2.34	2.00
	1 L/fed.	14.00	19.00	18.62	19.42	2.66	2.79
	2 L/fed.	15.00	20.00	18.52	24.89	2.69	3.56
Mean		14.06	17.33	17.72	19.43	2.97	2.78
10 m^3/fed.	without	16.33	15.00	16.67	27.00	2.38	3.86
	1 L/fed.	17.00	20.00	23.00	30.17	3.53	4.34
	2 L/fed.	21.00	23.67	24.83	39.00	3.85	5.82
Mean		18.11	19.56	21.5	32.06	3.38	4.68
20 m^3 /fed.	without	16.67	18.67	21.95	30.00	3.61	4.29
	1 L/fed.	18.33	25.67	24.87	33.00	3.69	4.79
	2 L/fed.	20.33	26.33	27.09	39.33	3.83	6.77
Mean		18.44	23.56	24.64	34.11	3.69	5.28
Average	without	15.39	15.56	18.22	23.66	2.78	3.38
	1 L/fed.	16.44	21.56	22.16	27.53	3.30	3.97
	2 L/fed.	18.78	23.33	23.48	34.41	3.46	5.38
LSD at 5% levels	Compost	0.73	1.44	1.60	2.11	0.37	0.51
	potassium	0.76	0.63	1.59	1.89	0.17	0.36
	interaction	NS	NS	NS	NS	NS	NS
Second season 2016							
Control	without	17.83	15.00	17.00	18.00	2.34	2.69
	1 L/fed.	18.33	16.67	21.00	19.00	2.66	2.77
	2 L/fed.	20.17	17.67	23.33	19.50	2.69	2.86
Mean		18.78	16.44	20.44	18.83	2.57	2.77
10 m^3/fed.	without	21.00	19.33	19.00	20.77	2.38	2.81
	1 L/fed.	22.00	21.33	23.67	22.17	3.53	2.85
	2 L/fed.	22.97	23.00	24.33	23.73	3.85	3.95
Mean		21.99	21.22	22.33	22.22	3.26	3.20
20 m^3 /fed.	without	23.67	23.00	25.00	24.50	3.61	3.47
	1 L/fed.	23.63	24.50	26.00	32.00	3.69	4.67
	2 L/fed.	24.73	24.67	27.67	33.67	3.83	4.93
Mean		24.01	24.06	26.22	30.06	3.71	4.36
Average	without	20.83	19.11	20.33	21.09	2.78	2.99
	1 L/fed.	21.32	20.83	23.56	24.39	3.29	3.43
	2 L/fed.	22.62	21.78	25.11	25.63	3.46	3.91
LSD at 5% levels	Compost	0.42	1.06	2.15	4.30	0.41	0.60
	Potassium	0.25	0.45	0.99	1.58	0.38	0.35
	Interaction	NS	NS	NS	NS	NS	NS

Another major role of foliar application of K is inphotosynthesis (Huber, 1985) by directly increasing leaf growth and leaf area index, and therefore, CO2assimilation (Wolf *et al*., 1976). Potassium foliar

application improved the outward translocation of photosynthetic from the leaf (Ashley and Goodson, 1972). These results are in endorsement with those of Subrahmanyam and Raju (2000), Zhang *et al*. (2006) and El-Tohamy *et al*. (2011).

3-Effect the interaction between Nile compost levels and foliar spray of potassium fertilizer:

Regarding the interaction effect, there were insignificant effects on broad bean plant growth parameters expressed as(plant length, number of leaves per plant fresh and dry weight of leaves and stems) in both seasons (Table, 2). The highest values ofthese parameters were registered by utilized20 $m^3$of compost with foliar spray of rising level of potassium thyosolfate at (2L\fed.). These returns were proper in both empirical seasons.

B- Total pods yield and its quality

1-Effect of Nile compost levels:

Data presented in Table (3) showed that total pods yield of broad bean expressed as number of pos/plant, weight of pod (g), pod length (cm), and total pods yield per fed.were significantly increased by increasing the level of Nile compost from 10 to 20m^3/fed. The increase in the total pods yield and pod characters maybe due to favorable effect of Nile compost on the vegetative growth. In addition, due also to the higher percentages of N, P and K uptake by bean plants received a higher level of Nile compost. Some implementer came to similar results (Melloni *et al.,* 1995; Eissa, 1996; El-Desuki *et al.,* 2000 and Ozores-Hampton*,* 2012).

2- Effect of potassium foliar application:

Foliar spraying of potassium thiosulfate (KTS) had a significant effect on yield and its ingredientas liken with control treatment in both seasons (Table, 3). The highest improved were resulted from foliar spray with potassium thiosulfate at highest standard (2L\fed.). However, the average data for potash foliar implementation of thiosulfate (KTS) detected that superior yield (1.090 and 1.253 ton/ fed.) for 1st and 2nd seasons, respectively with addition potassium thiosulfate (KTS) fertilizer at rate of 2L\fed. (Table 3) pursue by (0.964and 0.897 ton / fed.) with foliar spray of 1L \ fed. while the low yield (0.910 and 0.776 ton / fed.) was registered in control treatment. The answer of number of pods per plant and average pod weight as g\ pod pursue the same pattern of alteration like that mentioned above. These improved may be at reputed to the role of potassium on increasing photosynthetic activity which accounts much for high translocation of photo assimilates from leaves to the pods (Marschner, 1995). Also, this improved maybe related to increased pod tissue pressure potential (Lester *et al*., 2006) as well as enhanced phloem transport of Ca to pods. Moreover, crop response to a foliar spray of K sulfate at the R3-R4 stages of development demonstrated that soybean grain yield increased over 10 bu / acre when compared to a non-treated control (Nelson *et al.,* 2005). The acquired results were in conformity with those gained by Subrahmanyamand Raju (2000), El-Tohamy *et al*. (2011) and Milevthe, (2014) found that, increase of crop yield was highest after foliar treatment with potassium thiosulfate (KTS).

3-Effect the interaction between Nile compost levels and foliar spray of potassium fertilizer:

The interaction amidst the different standard of Nile compost and foliar application with potassium had significant effects on bean yield and its components (Table, 3). The highest amount were registered by utilized20 m^3 /fed. of compost with foliar spray by potassium thiosulfate (KTS) at high level (2L\fed.) yielded (1.347 and 1.253 ton\fed.) for1st and 2nd seasons, respectively followed by low level of compost fertilizer (10 m^3\fed.) with low level of thiosulfate (1L/fed.) and control treatment (0.910 and 0.897 ton\fed.) for 1st and 2nd seasons, respectively. These findings were true in both seasons. The statistical analysis of the obtained data recorded a significantly increase in total pods yield (ton\fed.) and number of pods per plant in both seasons.

Table 3: Effect of different levels of compost and foliar spray of potassium on total yield characters of broad bean plants during 2015 and 2016 seasons.

Compost levels	Foliar potassium levels	Total yield (ton/fed.)	Number of pods/plant	Number of seeds/pod	pod	
					Length (cm)	Weight (g)
		2015 season				
Without	without	0.723	8.67	4.00	11.33	8.89
	1 L/fed.	0.752	9.00	4.00	12.33	9.80
	2 L/fed.	0.790	10.00	4.33	12.67	10.40
Mean		0.755	9.22	4.11	12.11	9.70
10 m^3/fed.	without	0.813	9.33	4.33	14.00	10.33
	1 L/fed.	0.900	13.00	4.67	15.00	10.60
	2 L/fed.	1.133	13.33	5.00	16.67	11.33
Mean		0.949	11.89	4.67	15.22	10.76
20 m^3/fed.	without	1.193	10.00	5.00	14.67	10.50
	1 L/fed.	1.240	13.33	4.67	16.00	11.17
	2 L/fed.	1.347	14.67	5.33	18.33	12.53
Mean		1.260	12.67	5.00	16.33	11.40
Average	without	0.910	9.33	4.44	13.33	9.91
	1 L/fed.	0.964	11.78	4.44	14.44	10.52
	2 L/fed.	1.090	12.67	4.89	15.89	11.42
LSD at 5% level	Compost	0.017	0.47	NS	1.45	0.32
	Potassium	0.019	0.36	NS	0.58	0.21
	Interaction	0.032	0.62	NS	NS	NS
2016 season						
Without	without	0.653	5.33	4.33	11.83	5.00
	1 L/fed.	0.673	5.67	4.33	12.83	5.27
	2 L/fed.	0.693	6.00	4.67	14.33	5.93
Mean		0.673	5.67	4.44	13.00	5.40
10 m^3/fed.	without	0.777	6.67	5.00	14.83	6.30
	1 L/fed.	0.860	7.33	5.00	15..67	6.83
	2 L/fed.	1.067	7.67	5.33	16.67	7.60
Mean		0.901	7.22	5.11	15.72	6.91
20 m^3/fed	without	0.897	8.33	4.67	16.33	8.50
	1 L/fed.	1.157	11.00	5.00	17.33	9.27
	2 L/fed.	1.253	12.00	5.33	18.00	9.67
Mean		1.102	10.44	5.00	17.22	9.14
Average	without	0.776	6.78	4.67	14.33	6.60
	1 L/fed.	0.897	8.00	4.78	15.28	7.12
	2 L/fed.	1.004	8.56	5.11	16.33	7.73
LSD at 5% level	Compost	0.036	0.49	NS	0.40	0.47
	Potassium	0.021	0.52	NS	0.30	0.15
	Interaction	0.036	0.91	NS	NS	NS

C- Pod nutritional values:

1- Effect of Nile compost levels:

Data shown in Table (4) indicated that the percentages of nitrogen, protein, phosphorus and potassium content of dry seeds of broad bean were significantly improved with increasing the level of Nile compost manure from 10 to 20m^3/fed. these results might be due to the role of organic manure in increasing soil porosity, aeration, water holding capacity and cation exchange capacity(CEC), which encourage the biological activities of soil microorganisms and led to break down of organic matterreleasing N, P and K and other nutrients to the soil solution (Ozores-Hampton *et al.,* 2011). As these nutrients are available in the soil solution, absorption would be higher and nutrients uptake might be stimulated. These results agreed with those reported by Melloni *et al.* (1995); Jianming *et al.* (2008); Sarhan *et al.* (2011) and Adebayo *et al.* (2014) they reported that the highest TSS, total

sugars, protein, vitamin C and moisture contents in cucurbits fruits were obtained by increasing the levels of compost used

2-Effect of potassium foliar application:

Results in Table (4) display that, the percentage of N, protein, P and K in bean seeds tissues were significantly improved by potassium foliar application (thiosulfate) as liken with the control treatment. The highest values of chemical composition characters were obtained when bean plants sprayed with potassium thiosulfate at high level (2L\fed.) pursue by foliar spray by potassium thiosulfate at low level (1L\fed.) and control treatment in both seasons. Increasing nutritional values of pods could be attributed to the rapid absorption of these elements by the plant surface, especially the leaves and their translocation within the plant (Marschner, 1995).

Table 4: Effect of different levels of compost and foliar spray of potassium fertilizer on content of dry seeds of broad bean during 2015 and 2016 seasons.

Compost levels	Foliar spray of potassium	%			
		N	Protein	p	k
2015 season					
Without	without	1.900	11.457	0.343	1.660
	1 L/fed.	1.933	12.353	0.370	1.800
	2 L/fed.	2.013	13.357	0.410	1.913
Mean		1.949	12.389	0.374	1.791
10 m^3/fed	without	2.333	14.590	0.430	2.050
	1 L/fed.	2.653	16.940	0.467	2.183
	2 L/fed.	2.913	17.980	0.477	2.263
Mean		2.633	16.503	0.458	2.166
20 m^3/fed	without	3.013	18.833	0.490	2.330
	1 L/fed.	3.070	19.313	0.517	2.343
	2 L/fed.	3.167	20.830	0.543	2.413
Mean		3.083	19.659	0.517	2.362
Average	without	2.416	14.960	0.421	2.013
	1 L/fed.	2.552	16.202	0.451	2.109
	2 L/fed.	2.698	17.389	0.477	2.197
LSD at 5% level	Compost	0.189	1.377	0.018	0.121
	Potassium	0.099	0.392	0.006	0.041
	Interaction	NS	NS	NS	NS
2016 season					
Without	without	1.70	10.543	0.303	1.833
	1 L/fed.	1.87	11.960	0.333	1.917
	2 L/fed.	1.98	12.507	0.360	1.983
Mean		1.85	11.670	0.332	1.911
10 m^3/fed	without	2.25	14.063	0.390	2.050
	1 L/fed.	2.47	15.127	0.413	2.120
	2 L/fed.	2.53	15.813	0.440	2.163
Mean		2.42	15.001	0.414	2.111
20 m^3/fed	without	2.77	17.393	0.453	2.180
	1 L/fed.	2.89	18.083	0.480	2.203
	2 L/fed.	2.98	18.327	0.517	2.247
Mean		2.88	17.934	0.483	2.210
Average	without	2.24	14.000	0.382	2.021
	1 L/fed.	2.41	15.057	0.409	2.080
	2 L/fed.	2.50	15.549	0.439	2.131
LSD at 5% level	Compost	0.05.14	1.285	0.029	0.069
	Potassium	0.05	0.550	0.007	0.017
	Interaction	NS	NS	NS	NS

Similar results were obtained by El-Bassiony (2006) on onion, Fathy and El-Hamady (2007) on cowpea, El-Bassiony *et al.* (2010) on sweet pepper and El-Tohamy *et al.* (2011) on carrot. They suggest that potassium foliar application significantly affect N, P and K concentrations in plant leaves. The advance in the nutritional seeds tissues could be attributed to the mode of action of SO_4 anions inpromotes the photosynthetic activity and enzymes of carbohydrates diversion.

3-Effect the interaction between Nile compost levels and foliar spray of potassium fertilizer:

The interaction amidst compostn fertilizer and foliar potassium spray had a significant effect on N, protein, P and K percentage contents in bean seeds tissues (Table, 4). The highest values were registered whenuse 20 m^3 /fed. as compost fertilizer with high level of potassium foliar application as potassium thiosulfate (2L\fed.) in both seasons. These results may be due to the role of potassium in plant metabolism and many important regulatory operation in the plant. Moreover, potassium and sulfur could be increased mineral uptake by plants (Marschner, 1995). Also, the interaction effect between compost fertilization rates and potassium foliar application had a significant effect on nutrients content in bean seeds. These results are similar in both seasons. From data presented in Table (4) it could be clearly summarized that the highest values of nutrients content were recorded when bean plants received 20 m^3 /fed. as fertilization plus potassium thiosulfate as foliar application followed by other treatments. These increases may be ascribed to the role of potassium and sulfur on increasing photosynthetic activity which accounts much for high translocation of photo assimilates from leaves to the pods and seeds.

References

Abou El-Magd, M.M., T. El-Shourbagy and S.M. Shehata, 2012. A comparative study on the productivity of four Egyptian garlic cultivars grown under various organic material in comparison to conventional chemical fertilizer. Aust. J. Basic Appl. Sci., 6: 415-421.

Adebayo, J.O., A.O. Adebayo and A. Obembe, 2014. Efficacy of organomineral fertilizer and un-amended compost on the growth and yield of watermelon (*Citrullus lanatus* Thumb) in Ilorin Southern Guinea Savanna zone of Nigeria. Inter. J. Recycl. Org. Waste Agric., 3: 121-125.

AOAC., 1975. Association Agricultural Chemist, Washington, D.C., 200. Official Method of Analysis12 th Edn., 44: 94-117.

Arisha, H.M. and A. Bradisi, 1999. Effect of mineral fertilizers and organic fertilizers on growth, yield and quality of potato under sandy soil conditions. Zagazig J. Agric. Res., 26: 391-405.

Ashley, D.A. and R.D. Goodson, 1972. Effect of time and plant potassium status on C-labeled photosynthate movement in cotton. Crop Science., 12: 686-690.

Awatef G. Behairy, Asmaa R. Mahmoud, M.R. Shafeek, Aisha H. Ali and Magda M. Hafez, 2015. Growth, Yield and Bulb Quality of Onion Plants (*Allium cepa* L.) as Affected by Foliar and Soil Application of Potassium. Middle East Journal of Agriculture, 4(1): 60-66.

Brown, J.D. and Lilleland, 1964. Rapid determination of potassium and sodium in plant material andsoil extracts by flamphotometery. Proc. Amer. Soc. Hort. Sci., 48: 341-346.

Chen, Y., C. Clapp and H. Magen, 2004. Mechanism of plant growth stimulation by humic substances: The role of organo-iron complexes. Soil Sci. Plant Nutr., 50: 1089-1095.

Dauda, S.N., F.A. Ajayi and E. Ndor, 2008. Growth and yield of water melon (*Citrullus lanatus*) as affected by poultry manure application. J. Agric. Soc. Sci., 4: 121-4.

Eissa, N.M., 1996. Studies on sustainable agriculture for some vegetable crops using animal manure. M.Sc. Thesis, Institute of Environmental Studies and Research, Ain Shams Univ., Cairo, Egypt.

El-Bassiouny, A.M., 2006. Effect of potassium fertilization on growth, yield and quality of onion plants. J. Appl. Sci. Res., 2(10): 780-785.

El-Bassiony, A.M., Z.F. Fawzy, E.H. Abd El-Samad and G.S. Riad, 2010. Growth, yield and fruit quality of sweet pepper plants (*Capsicum annuum* L.) as affected by potassium fertilization. Journal of American Science, 6(12): 722-729.

El-Desuki, M., M.R. Shafeek and O.M.M. Sawan, 2000. Effect of organic and mineral fertilization on growth, yield and quality of cantaloupe (*Cucumis melo,* L.). Egypt. J. Appl. Sci., 15(12): 585-603.

El-Tohamy, W.A., H.M. El-Abagy, M.A. Badr, S.D. Abou-Hussein and Y.I. Helmy, 2011. The influence of foliar application of potassium on yield and quality of carrot (*Daucus carota* L.) plants grown under sandy soil conditions. Aust. J. Basic & Appl. Sci., 5(3): 171-174.

Fathy, E.E. and M.M. El-Hamady, 2007. Response of cowpea plants (*Vigna unguiculata* L.) to some bio stimulants and organic nutrients during late summer season. J. Product. Dev., 12(1): 237-250.

Gomez, K.A. and A.A. Gomez, 1984. Statistical procedures for Agricultural Research (Second Ed.), pp:457- 423. John Wiley and Sons. Inter. Sci. Pub. New York.

Hassan, A.H., 2015. Improving Growth and Productivity of two Garlic Cultivars (*Allium sativum* L.) Grown under Sandy Soil Conditions. Middle East Journal of Agriculture, 04(02): 332-346.

Huber, S.C., 1985. Role of potassium in photosynthesis and respiration. pp. 369-396. In Potassium in Agriculture. American Society of Agronomy, Madison, WI.

Jasim, A.H., 2007. Effect of foliar fertilization on growth and yield of broad bean *Vicia faba* L. Alanbar J. Agric. Sci., 5(2): 177-182.

Jianming, L., W. Putea, M.H. Behboudianc, W. Zhonghongd and A. Mortonc, 2008. Response of cantaloupe to cattle or sheep manure compost mixed with sandy soil. J. Organic Sys., 3(2): 261-269.

Jimenez, D.F., R.P. Cano and M.C. Maeda, 1997. Effect of different solarization periods on melon development. ITEA Production Vegetal., 93(2): 116-125.

John L. Jifon and Gene E. Lester, 2011. Effect of Foliar Potassium Fertilization and Source on Cantaloupe Yield and Quality. Better Crops, 95(1): 13-15.

Lester, G.E., J.L. Jifon and G. Rogers, 2005. Supplemental foliar potassium applications during muskmelon fruit development can improve fruit quality, ascorbic acid, and beta-carotene contents. J. Amer. Soc. Hort. Sci., 130: 649-653.

Lester, G.E., J.L. Jifon and D.J. Makus, 2006. Effect of foliar potassium fertilization and source on cantaloupe yield and quality. Hort Science, 41: 741-744.

Marculescu, A., C. Sand, C. Barbu, H.D. Babit and D. Hanganu, 2002. Possibilities of influencing the biosynthesis and accumulation of the active principals in *Chrysanthemum balsamita* L. specie Roum. Biotech. Lett., 7(1): 577-548.

Marschner, H., 1995. Functions of mineral nutrients: micronutrients. In: Mineral Nutrition of Higher Plants. 2nd Ed., Academic Press, London, pp: 313-404.

Melloni, R., K.M.R. Duarte and E.J. Cardoso, 1995. Influence of compost and or effective microorganisms on the growth of cucumber and on the incidence of *Fusarium* wilt. Phytopath., 21(1): 21-24.

Milevthe, G., 2014. Effect of Foliar Fertilization on Nodulation and Grain Yield of Pea (*Pisum sativum* L.).Turkish Journal of Agricultural and Natural Sciences.

Naeem, M., J. Iqbal and M.A.A. Bakhsh, 2006. Comparative Study of Inorganic Fertilizers and Organic Manures on Yield and Yield. Components of Mung bean (*Vigna radiat* L.). J. Agric. Soc. Sci., 2: 227-9.

Nelson, K.A., P.P. Motavalli, and M. Nathan, 2005. Response of no-till soybean to timing of preplant and foliar potassium applications in a claypan soil. Agron. J. 97: 832-838.

Ozores-Hampton, M.P., 2012. Developing a vegetable fertility program using organic amendments and inorganic fertilizers. Hort Tech., 22(6): 743-750.

Ozores-Hampton, M.P., P.A. Stansly and T.P. Salame, 2011. Soil chemical, biological and physical properties of a sandy soil subjected to long-term organic amendments. J. Sustain. Agric., 353: 243-259.

Pregl, F., 1945. "Quantitative organic micro analysis" 1st Ed. Cl. And A-chrdill, 1td. London.

Rafaat, J.G., R.A. Hussein and M.M. Ahmad, 2016. Effect of fertilizer application on vegetative growth characters of broad bean (*Vicia faba* L.). International Journal of Plant, Animal and Environmental Sciences, 6(1): 103-108.

Sarhan, T., G.H. Mohamed and J.A. Teli, 2011. Effect of bio and organic fertilizer on growth, yield and fruit quality ofsquash plants. Sarhad J. Agric., 27(3): 451-460.

Shafeek, M.R., F.S. AbdEl-Al and M.M. AbdEl-Mouty, 2003. The productivity of Garlic plant as affected by the addition of nitrogen fertilizer in the form of organic and / or inorganic. J. Agric. Sci., Mansoura Univ., 28(10): 7395-7403.

Shafeek, M.R., A.M. Shaheen, E.H. Abd El-Samad, Fatma A. Rizk and Faten S. Abd El-Al, 2015. Response of Growth, Yield and Fruit Quality of Cantaloupe Plants (*Cucumis melo* L.) to Organic and Mineral Fertilization. Middle East Journal of Applied Sciences, 5(1): 76-82.

Shrestha, K., E.M. Adetutu, P. Shrestha, K.B. Walsh, K.M. Harrower, A.S. Ball and D.J. Midmore, 2011.Comparison of microbially enhanced compost extracts produced from composted cattle rumen

Stewart, M.W., W.D. Dibb, E.A. Johnston and J.T. Smyth, 2005. The contribution of commercial fertilizer nutrients to food production. Agron. J., 97: 1-6.

Subrahmanyam, S.V.S. and D.V.R. Raju, 2000. Influence of foliar feeding with water soluble specialty fertilizers on three vegetable crops. Advances in Plant Sciences, 13 (2): 589-594.

Suresh, K.D., G. Sneh, K.K. Krishn and C.M. Mool, 2004. Microbial biomass carbon biomass carbon and microbial activities of soils receiving chemical fertilizers and organic amendments. Archives Agron. Soil Sci., 50: 641-647.

Trough, E. and A.H. Meyer, 1939. Improvements in denies colorimetric method for phosphorus and arsenic. Ind. Eng. Chem. Anal. Ed., 1: 136- 139.

Wolf, D.D., Kimbrough, E.L. and R.E. Blaser, 1976. Photosynthetic efficiency in alfalfa with increasing potassium nutrition. Crop Science., 16: 292-294.

Zeidan, M.S., 2007. Effect of organic manure and phosphorus fertilizers on growth, yield and quality of lentil plants in sandy soil. Res. J. Agric. Biol. Sci., 748: 752.

Zhang, G., H. Song-Jiang and X. Song-Hong, 2006. Effect of foliar spraying KH PO on seed production of carrots (*Daucus carota* L.). China Vegetables, (7): 11-13.