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Physiological and Biochemical Responses of Two Cultivars of *Phaseolus vulgaris* L. to Application of Organic Fertilizers and Nile Compost in Sandy Soil

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Authors' contributions

This work carried out by cooperation between all authors as team work as follow: Author SMA, designed the study, performed the statistical analysis, wrote the protocol. Authors SMA and HHL wrote the first draft of the manuscript. Authors HHL and NM managed the analyses of the study. Author NM managed the literature searches. All authors read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: The present work aims to stimulate some physiological changes in the plants using organic fertilizer and compost by enhancing some compounds such as total amino acids and phytohormones in two cultivars of bean.
Study Design: The pots of the (*Phaseolus vulgaris*) L. cv. bronco were divided into 7 sub-groups they will be prepared as in the seven treatments via1- control , Nile compost ,compost and rice straw , compost and maize stalks , rice straw and maize stalks , rice straw , maize stalks and were replicate times for *Phaseolus vulgaris* L. cv. paulista from T_8-T_{14}. After 45 days (vegetative stage), 90 days for (flowering stage) and 130 days for (fruiting stage) the plants were harvested.
Place and Duration of Study: Department of Biological and Geological Science, Faculty of Education, Ain Shams University, Cairo-Egypt June 2012.
Methodology: Growth, yield, free amino acids and phytohormones of two cultivars of *Phaseolus vulgaris* L. cv. paulista and cv. bronco was investigated.
Results: The results showed that the significant differences in growth in all the stages and

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percent of free amino acids and phytohormones in shoot in vegetative stage in two cultivars of bean were obtained with mixture of compost or maize stalk and maize stalk decompost.

Conclusion: Generally, the addition of organic fertilizer with compost led to improve the yield of two cultivars as compared to control. Hence, it could be suggested that the treated plants, with these organic residues and Nile compost increased the growth, yield and the above chemical compositions.

Keywords: Phaseolus vulgaris; sandy soil; free amino acids; phytohormones.

1. INTRODUCTION

Fertilizer is any material, organic or inorganic, natural or synthetic, that supplies plants with the necessary nutrients for plant growth and optimum yield. Organic fertilizers are natural materials of either plant or animal origin, including livestock manure, green manures, crop residues, household waste, compost, and woodland litter. Organic manure plays direct role in plant growth as a source of all necessary macro and micronutrients in available forms during mineralization and improving physical and chemical properties of soils [1]. It plays an important role in increasing growth, yield and yield components of many crops. [2] reported that organic manures significantly affected tomato plant height, leaf area and fruit number plant.

Compost has been recognized as a low cost and environmentally sound process for treatment of many organic wastes [3]. It is a plant residue, animal residue or a mixture of both that has been decomposed and recycled as a fertilizer and soil amendment. The application of compost has been shown to positively affect the structure, porosity, water holding capacity, compression strength ,nutrient content and organic matter content of the soil all of these improve plant growth, crop yield and crop quality [4]. Organic fertilizer effect on amino acid on plant, that it increased the latter by treating the soil with different organic fertilizer. [5] showed that organic fertilizer leads to new amino acids compared with the amino acid in the control treatment in wheat grain and dry shoots. [6] showed that application of compost significantly increased the level of total free amino acid in the leaves of mustard when compared to control.

Furthermore, organic matter increased plant hormone-like activity [7,8]. The alteration in different aspect of cellular metabolisms including the content of phytohormones could be arising from the different compounds present in the organic fertilizer.

Phaseolus vulgaris L. is one of the most important members of leguminous crops in Egypt grown for either local consumption or exportation, it is known as green bean or snap bean it is an important source of protein and energy for many developing countries. It’s Rich in protein, dietary fibers, minerals (Ca, P, Fe, K, Mg & Mn) and vitamins (A, B1, B2 & C) with high amino acids [9].

The present work aims to stimulate some physiological changes in the plants using organic fertilizer and compost by enhancing some compounds such as total amino acids and phytohormones in two cultivars of bean.

2. MATERIALS AND METHODS

Seeds of (*Phaseolus vulgaris*) L. cv. bronco and *Phaseolus vulgaris* L. cv. paulista were obtained from Agriculture Research Center, Ministry of Agriculture, Giza, Egypt.

Seeds of Snap bean were surface sterilized for 1 min in70 % (v/v) ethanol, 20 min in 5% (v/v) sodium hypochlorite and rinsed five times with sterile bidistilled water. A pot experiment was conducted in the greenhouse of Faculty of Education; Cairo, Egypt with a sandy soil collected from Arab Guhaina, Qalyubia, Egypt has pH 7.3, EC 2.56 MHz/cm, organic matter 0.2%, CaCO3 2.3%. All pots will contain equal amounts of sandy soil and kept inside an open- air wire house during plant growth and development. 140 pots (about 30 cm) were divided into two groups consisting 70 pots for each cultivar of *Phaseolus vulgaris.*

The pots of the first group were divided into 7 sub-groups they will be prepared as in the following scheme:

Seven treatments via

1- control T_1

2- Nile compost T_2. (Composition of Nile compost) Soft lime Super phosphate contains 15 % phosphate 2 or 5 soluble in water.

3- compost and rice straw T_3.

4- compost and maize stalks T_4.

5- rice straw and maize stalks T_5 .

6- rice straw T_6.(Composition of rice straw) the chemical composition of rice straw varies between varieties and growing seasons, with higher nitrogen and cellulose contents in early-season rice compared to others. The composition of 50 rice varieties was measured for a number of factors. Ash and fiber content ranged from 13.4 percent to 20.4 percent and 56.3 percent to 68.9 percent respectively. Lignin. ranged from 3 percent to 4.4 percent and silica ranged from 8.8 percent to 13.3 percent. Nitrogen ranged from 0.19 percent to 0.86 percent; fat ranged from 0.80 percent to 1.13 percent.

7- maize stalks T_7. (Composition of maize stalks) the chemical compositions of corn (maize) stalk. The nutrients composition % of corn stalk on DM basis were DM; 90, OM; ,93, CP; 5, CF; 35, EE; 1.3, Ash; 7 while the fiber fraction were CF; 35, NDF; 44, ADF; 70. and for the corn fodder on DM basis were DM; 37, OM; 93, CP; 9, EE; 2.4, Ash; 7 while the fiber fraction were CF; 25, NDF; 29, ADF; 48.

And were replicated times for *Phaseolus vulgaris* L. cv. paulista from T_8-T_{14}.

The pots were watered for the germination of seeds. After 45 days (vegetative stage) ,90 days for (flowering stage) and 130 days for (fruiting stage) the plants were harvested and washed with distilled water. The morphology fresh weights of shoots and roots and shoot length were determined in 10 plants. The samples were oven dried at 70ºC for 72 h. and the dry weights of shoot and root were determined. The obtained data were analyzing statistically by using t test at 5% and 1%.

2.1 Determination of Phytohormones

Extraction and estimation of phytohormones were carried out as according to the method of [10]. Indol 3-acetic acid (IAA), Gibberellic acid (GA), Abscisic acid (ABA) was analyzed. Five gram fresh weight samples were placed in 100 ml methanol: chloroform: 2 N ammonium hydroxide (12:5:3 v/v/v) and homogenized using a Kinematic Polytron Homogenizer. After addition 1 µg/100 ml Butylated Hydroxytoluene (BHT), the samples were frozen at -80ºC for one week, for further analysis. Then the extracts were transferred into 250 ml conical flasks and added 22.4 ml bi-distilled water. To obtain a homogeneous mixture, the conical flasks were shaken 3 or 4 times. Thus, with the exception of plant growth substances, the other organics in methanol were allowed to pass into the chloroform phase. The extraction, purification and quantitative determination of total IAA, GA3 and ABA were done according to literature methods of [10].

2.2 Quantitative Determination of Total Amino Acids

Total amino acid composition of Snap bean seeds was determined by amino acid analyzer apparatus model “Eppendorf LC3000” using the method of [11].

2.2.1 Acid hydrolysis

0.3g of Snap bean seeds powder was defeated with soaking in diethylether overnight to be sure that the sample does not contain any fats and remove pigments and impurities in the samples to be clear. A known weight (0.3g) of defeat plant material received 10 ml 6 N hydrochloric acid in a sealed tube, and then placed in an oven at 110ºC. For 24 hours.

Hydrolyzates were transferred quantitatively into a porcelain dish and the hydrochloric acid was then evaporated to dryness at 50-60ºC on a water bath. Distilled water (5 ml) was added to the hydrolyzate and then evaporated to dryness to remove the excess of hydrochloric acid and finally the residue was dissolved in 10 ml distilled water and filtrate through a 0.45 mm filter. The filtrate was dried under vacuum with a rotary evaporator, then 10 ml of distilled water was added and the samples dried a second time. One ml of 0.2 N sodium citrate buffers at pH 2.2 was added and the samples stored frozen in a sealed vial until separation of amino acids by the amino acid analyzer.

Separation of amino acids by amino acid analyzer: Samples of amino acids were injected in amino acid analyzer (Eppendorf LC 3000). Each amino acid is separated at specific pH, and then colored by reagent named Ninhydrin. Ninhydrin (triketohydrindene hydrate) is an oxidating agent which leads to the oxidative deamination of alpha-amino groups. It is very important for the detection and the qualitative analysis of amino acids. Ninhydrin also reacts with primary amines however the formation of carbon dioxide is quite diagnostic for amino acids. Alpha amino acids yield a purple substance that absorbs maximally at 570 NM. Amino acids (Proline) yield a yellow product (absorption maximum 440 NM).

2.2.2 Statistically analyzed

Data were statistically analyzed using F-test and LSD at 5 and 1% levels of probability according to [12].

3. RESULTS AND DISCUSSION

3.1 Effect of Organic Fertilizer on Growth Parameters

The data in (Table 1, 2) revealed that there are significant differences between the studied cultivars in the vegetative stage (length of stems, length of roots, number of leaves and leaflets, fresh weight of stems and roots.

These results indicate that significant increases occurred in all growth parameters in two cultivars at groups T_4, T_7, T_{11} and T_{14} in compared to control, at the same time the two cultivars were shown no significant differences in the number of leaflets at T_2 , T_3, T_5 , T_6 , T_9, T_{10}, T_{12} and T_{13} treatment in both the cultivars. On the other hand no significant difference in the number of leaves for all treatments in both the cultivars.

At the second stage all tested organic fertilizers in combination with Nile compost caused a highly significant increase in the growth parameters (length of stems and roots, number of leaves and leaflets, fresh weights of stems and roots and the number of flowers in *Bronco* cv. (Table 3). On the other hand there were no significant differences in the number of leaves except the treatment at a mixture of compost and maize T_{14}. Similary in case of Paulista cv., (Table 4). The number of leaflets increased significant except in the treatment of T_{12} and T_{13} as compared to control.

The fresh weight of roots showed no significant difference due to adding straw rice only T_{13}. Furthermore, the data revealed that no. of leaves in *Paulista* cv. Showed no significant differences in all treatments , except in T_9 , T_{11} and T_{14}.

In fruiting stage, growth parameters of bronco cv. cultivar exhibited highly significant difference at L.S.D. 0.05% and 0.01%, in all treatments, except in leaves and leaflets number of T_2 and in root fresh weight of T_5. The increases were highly significant in length of stem, number, of legume, number of seed legume, weight of pods, fresh weight of stem, and root (Table 5).

The number of leaves showed no significant difference in all treatments except, decompsted maize stalk only T_{14} which showed highly significant difference at 0.05% and 0.01% levels.

The number of leaflets was exhibited (Table 6) no significant difference as a result of organic fertilizer application alone or combined with Nile compost in all groups except T_{11} and T_{14} where a highly significant increase was observed as compared to control. Organic fertilizer plays a direct role in plant growth [13].

[14] observed that similar results were obtained in wheat treated with the application of organic manure and compost. The effects of organic manure on the vegetative growth parameters could be related to the role of released nitrogen, phosphorus and potassium from organic manure .In addition they play a vital role in photosynthesis, carbohydrate transport, protein synthesis , control of ionic balance, regulation of plant stomata functions, water use and activation of plant enzymes and other processes [15,16,17].

[18] observed that carbon compounds like cellulose and hemicellulose contained in plant residues are easily broken down and then can exert a considerable depressing effect on the nitrifying of the low-N materials. This could cause temporary immobilization of N in the soil,

which would thus interfere with plant growth. However, the effects of organic fertilizers on plant growth seem to vary, and some studies showed decreased plant growth or yields when using organic fertilizers compared with conventional fertilizers [19].

The increase in growth and development during the following data could be due to the presence of phytohormones in organic fertilizers that stimulate plant growth [20]. Data presented in this investigation show varietal differences between both cv. bronco and cv. paulista in some growth characters at 30, 60 and 120 days after sowing. These differences between bean cultivars may be due to genetical differences between genotypes concerning partition of dry matter. In this regard, [21] found that the addition of organic manure combined with chemical fertilizers improved vegetative growth of sweet pepper plants.

[22] showed that in the early growth stage, there is a obviously lower in the stem length, the stem diameter and the dry weight of the organic manure cultivation in compared to another two stages; the mainly limit factors is the nutrient deficiency in the soil caused by the organic manure has not been fully decomposition. However, the findings of this investigation results of the composted maize stalks and mixed between rice straw and maize stalks treatment were found best than other mixed treatments. The maximum overall growth and yield record from the compost treatment and admixed with FYM were found consistent with the findings of [23]. The maximum biomass obtained may be due to high composition of Nitrogen in organic fertilizers, which supplement to the plant's vegetative phase. The experiment results revealed that the highest productivity by composted maize stalks and mixed between rice straw and maize stalks treatments may be due to the improvement of physico-chemical properties of the soil and can be used as a resource for maximum crop productivity with more financial output in comparison to those chemical fertilizers.

It is clear also from results that application of organic fertilizer increase most growth characters. The highest increases in the characters mentioned before were obtained by rice straw and mixed between rice straw and maize stalks and the least values were observed with compost and rice straw only. This trend could be explained on a basis that maintaining sufficient available nutrients during the growth period could be achieved through organic materials application rather than through the mineral fertilization. These results are also in agreement with those obtained by [24] who showed that organic manure plus mineral fertilizer increase vegetative growth of broccoli plants.

All organic manures treatments increase the dry matter accumulation in the different plant organs, i.e. roots, shoots and consequently the completely peanut plants. This finding indicates the vital role of organic fertilization in more release of available nutrient elements to be absorbed by plant roots and this in turn increase dry matter content in the different peanut plant organs [25]. On the other hand, the ability of organic compost to produce such effects varies greatly with the type of organic waste used. Application of composted rice straw exhibited higher values in dry weight of different peanut organs as compared to the other organic wastes, while composted water hyacinth along recorded the highest R/S ratio [26].

The fresh weight and number of nodules were increased because of organic wastes application as compared to chemical fertilizer treatment [27]. The favorable influence of Nile compost on growth might be attributed to its effect on supplying the trees with their requirements from various nutrients, reducing soil pH, encouraging of microorganism's activity and producing natural auxins . The compost could serve as a naturally produced, slow release source of plant nutrients and their amendment has been shown to increase plant dry weight [28]. Application of compost in combination with chemical fertilizer resulted in larger leaf area index [29]. A higher leaf area index, plants become photosynthetically more active, which would contribute to improvement in yield, attributes [30].

3.2 Effect of Organic Fertilizer on Yield

All tested organic wastes, caused increases in the yield components compared to control i.e. number and yield of pods, and seed yield. [31] stated that organic manure alone or in combination with synthetic fertilizers significantly increased grain and biological yield against control.

No significant differences in yield of pods and seeds were obtained between different organic wastes alone and NPK treatment. [1] reported that incorporating rice straw into soil has increased grain yield 15–18%. Direct seeded rice (DSR) may also show the effects on grain yield of incorporation of rice straw for a couple of years in the same way as transplanted rice.

Regarding the characteristic of bean as related with the quality of yield, data indicate that, significant differences calculated in number of pods and seeds per 100 g, number of seeds per pod, weight of 100 g pods and seed index between different composted organic wastes. These results may be due to the higher levels of organic matter and nutrients in composts [32] as well as the positive effect of composting on reduction of the germination capacity of weeds and soil-borne pathogens. The positive action of different N sources on growth and nutritional status could result in enhancing the yield. In coincidence with the present results those obtained by [33].

The addition of rice straw and mix it in the soil led to the improvement of soil properties in the form of soil penetration resistance as well as access to good specifics yield. Thus increasing the productivity of wheat and rice, which were grown with successive seasons during throughout the experiment compared to cultivated crop in the treatment without rice straw.

There was a consistent trend for similar or higher yield with rice straw, with some significant differences. Higher or similar wheat yield under rice straw mulch was also reported in other studies in the same environment [34]. The higher yields with maize stalks in our experiments were probably due to increased soil water availability compared with the control.

3.3 Effect of Organic Fertilizer on Phytohormones

Data in Table 7 revealed that the effect of organic fertilizers stimulated the synthesis of phytohormone in two cultivars. The phytohormone IAA increased in all treatments in two cultivars except by adding straw rice, there was reduced in IAA synthesis in comparison to control. However, using compost , mixture of compost and maize stalk, mixture of maize stalk and straw rice and decompost maize stalk only, increased GA when compared to control in cv. bronco . On the other hand, there were increases in GA synthesis in cv. Paulista due to organic fertilization. ABA differd values in most of tested samples. However there was reduced in ABA when treated with a mixture of compost and maize stalk and decompost maize stalk only. The better efficiency of organic manures might be due to the fact that the organic manures would have provided the micronutrients such as Zn, Cu, Fe, Mn, and Mg in an optimum level. Zinc is involved in the biochemical synthesis of the most important phytohormone, IAA through the pathway of conversion of tryptophan to IAA [35].

Table1. Effect of compost and organic fertilizers on growth parameters of *Phaseolus vulgaris* bronco cv. (vegetative stage)

Soil treatments	*Quantity (g/pot)*	*Length of stem (cm)*	*Length of root (cm)*	*No. of leaves (/ 10 plants)*	*No. of leaflets (/ 10 plants)*	*Fresh weight of stem g/plant*	*Fresh weight of root g/plant*
T_1	–	11.50	25.60	3.00	5.00	2.67	2.04
T_2	17 gm / pot	13.00**	22.30**	3.00 ns	5.00 ns	2.76*	2.02 ns
T_3	8.5 gm of each component/pot	12.80**	22.00**	3.00 ns	5.00 ns	3.00**	1.85*
T_4	8.5 gm of each component/pot	13.80**	28.00**	3.00 ns	6.00**	3.51**	2.60**
T_5	8.5 gm of each component/pot	13.00**	24.00**	3.00 ns	5.00 ns	3.50**	2.21*
T_6	17 gm / pot	12.00**	21.10**	3.00 ns	5 .00ns	2.50**	1.50**
T_7	17 gm / pot	13.50**	31.00**	3.00 ns	6.00**	3.95**	4.01**
L.S.D. 0.05%		0.14	0.63	0.00	0.09	0.09	0.14
0.01%		0.20	0.91	0.00	0.12	0.13	0.21

*No: Number, CV: Cultivar, LSD: Least significant difference, **: Highly significant difference, ns: no significant difference. (T_1,Control;T_2, composts; T_3, compost + rice straw;T_4, compost + maize stalk; T_5, rice straw + maize stalk;T_6, rice straw; T_7, maize stalk).*

Table 2. Effect of compost and organic fertilizers on growth parameters of *Phaseolus vulgaris* paulista cv. (vegetative stage)

Soil treatments	*Quantity (g/pot)*	*Length of stem (cm)*	*Length of root (cm)*	*No. of leaves (/ 10 plants)*	*No. of leaflets (/ 10 plants)*	*Fresh weight of stem g/plant*	*Fresh weight of root g/plant*
T_8	–	13.70	19.30	3.00	5.00	2.10	0.96
T_9	17 gm / pot	18.20**	26.00**	3.00ns	5.00ns	2.90**	1.20**
T_{10}	8.5 gm of each component/pot	14.50**	19.80ns	3.00ns	5.00ns	2.80**	1.30**
T_{11}	8.5 gm of each component/pot	15.60**	26.20**	4.00ns	6.00**	3.62**	1.80**
T_{12}	8.5 gm of each component/pot	15.00**	26.00**	3.00ns	5.00ns	3.40**	1.72**
T_{13}	17 gm / pot	14.00*	19.00ns	3.00ns	5.00ns	3.08**	1.41**
T_{14}	17 gm / pot	16.00**	29.00**	4.00**	8.00**	3.09**	1.20**
L.S.D. 0.05%		0.27	0.72	0.09	0.20	0.09	0.05
0.01%		0.38	1.04	0.12	0.29	0.12	0.08

*No: Number, CV: Cultivar, LSD: Least significant difference, **: Highly significant difference, ns: no significant difference. (T8, Control;T 9,composts; T 10, compost + rice straw;T 11, compost + maize stalk; T12, rice straw + maize stalk;T13, rice straw;T 14, maize stalk).*

Table 3. Effect of compost and organic fertilizers on growth parameters of *Phaseolus vulgaris* bronco cv. (flowering stage)

Soil treatments	Quantity (g/pot)	Length of stem (cm)	Length of root (cm)	No. of leaves (/ 10 plants)	No. of leaflets (/ 10 plants)	Fresh weight of stem g/plant	Fresh weight of root g/plant	No. of flowers (/plant)
T_1	–	17.00	20.10	4.00	12.00	5.45	1.50	5.00
T_2	17 gm / pot	19.50**	21.50**	5.00**	9.00**	4.97**	1.93**	6.00**
T_3	8.5 gm of each component/pot	18.50*	18.30**	7.00**	13.00**	3.48**	1.73**	8.00**
T_4	8.5 gm of each component/pot	20.90**	27.20**	7.00**	16.00**	5.77**	2.90**	8.00**
T_5	8.5 gm of each component/pot	19.00**	20.20ns	5.00**	17.00**	5.04**	2.08**	6.00**
T_6	17 gm / pot	20.00**	20.90**	5.00**	15.00**	5.10**	3.07**	8.00**
T_7	17 gm / pot	23.80**	22.90**	9.00**	17.00**	7.29**	3.29**	14.00**
L.S.D. 0.05%		0.37	0.50	0.30	0.52	0.20	0.13	0.50
0.01%		0.54	0.72	0.44	0.75	0.29	0.18	0.71

*No: Number, CV: Cultivar, LSD: Least significant difference, **: Highly significant difference, ns: no significant difference. (T_1,Control;T_2, composts; T_3, compost + rice straw;T_4, compost + maize stalk; T_5, rice straw + maize stalk;T_6, rice straw; T_7, maize stalk).*

Table 4. Effect of compost and organic fertilizers on growth parameters of *Phaseolus vulgaris* paulista cv. (flowering stage)

Soil treatments	Quantity (g/pot)	Length of stem (cm)	Length of root (cm)	No. of leaves (/ 10 plants)	No. of leaflets (/ 10 plants)	Fresh weight of stem g/plant	Fresh weight of root g/plant	No. of flowers (/plant)
T_8	–	18.00	21.00	4.00	10.00	3.88	1.01	5.00
T_9	17 gm / pot	17.20**	23.60**	5.00**	13.00**	5.61**	1.71**	6.00**
T_{10}	8.5 gm of each component/ pot	17.40**	23.00**	4.00ns	11.00**	5.52**	1.98**	6.00**
T_{11}	8.5 gm of each component/ pot	19.00**	24.30**	6.00**	13.00**	6.55**	2.26**	7.00**
T_{12}	8.5 gm of each component/ pot	17.50**	21.40*	4.00ns	10.00ns	4.88**	1.15*	6.00**
T_{13}	17 gm / pot	17.40**	20.70**	4.00ns	10.00ns	4.04ns	1.12ns	6.00**
T_{14}	17 gm / pot	21.00**	25.00**	7.00**	17.00**	6.71**	2.88**	7.00**
L.S.D. 0.05%		0.24	0.30	0.21	0.45	0.20	0.12	0.12
0.01%		0.35	0.43	0.31	0.65	0.28	0.17	0.17

*(No: Number, CV: Cultivar, LSD: Least significant difference, **: Highly significant difference, ns: no significant difference. (T8, Control; T 9,composts; T 10, compost + rice straw;T 11, compost + maize stalk; T12, rice straw + maize stalk;T13, rice straw;T 14, maize stalk).*

Table 5. Effect of compost and organic fertilizers on growth of yield of *Phaseolus vulgaris* bronco cv. (fruiting stage)

Soil Tretments	Quantity (g/pot)	Length of stem (Cm)	Length of root (Cm)	No. of leaves/ plant	No. of leaflets /plant	No. of legume /plant	No. of seeds /pod	Weight of legume (g)	Fresh weight of stem g/plant	Fresh weight of root g/plant
T_1	–	17.00	21.50	6.00	13.00	2.0	4.0	1.94	2.33	1.91
T_2	17 gm / pot	18.50ns	22.50**	6.00ns	13.00ns	3.00**	6.00**	3.04**	3.22**	1.76*
T_3	8.5 gm of each component/ pot	18.00**	23.10**	7.00**	15.00**	4.00**	9.00**	4.13**	3.33**	2.31**
T_4	8.5 gm of each component/ pot	20.00**	24.03**	7.00**	15.00**	4.00**	10.00**	4.26**	4.81**	2.54**
T_5	8.5 gm of each component/ pot	19.00**	23.40**	7.00**	14.00**	3.00**	8.00**	3.05**	3.03**	1.98ns
T_6	17 gm / pot	18.00*	23.20**	7.00**	14.00**	3.00**	6.00**	3.55**	2.74**	2.09**
T_7	17 gm / pot	22.00**	26.80**	8.00**	17.00**	4.00**	12.00**	6.66**	5.40**	3.71**
L.S.D. 0.05%		0.75	0.29	0.12	0.24	0.13	0.48	0.26	0.20	0.12
0.01%		1.08	0.42	0.17	0.35	0.19	0.69	0.37	0.28	0.17

*No: Number, CV: Cultivar, LSD: Least significant difference, **: Highly significant difference, ns: no significant difference. (T_1,Control;T_2, composts; T_3, compost + rice straw;T_4, compost + maize stalk; T_5, rice straw + maize stalk;T_6, rice straw; T_7, maize stalk).*

Table 6. Effect compost and organic fertelizers on growth of yield of *Phaseolus vulgaris* paulista cv. (fruting stage)

Soil Tretments	Quantity (g/pot)	L. of stem (Cm)	L. of root (Cm)	No. of leaves/ plant	No. of leaflets / plant	No. of Legumes/ plant	No. of seeds/ leguems	Weight of pods (g/Plants)	Fresh w. of stem g/plant	Fresh w. of root g/plant
T_8	-	21.20	20.9	6.00	13	2	5	3.32	3.96	1.99
T_9	17 gm / pot	22.30**	25.00**	6.00ns	13.00ns	4.00**	9.00**	3.87**	3.58**	1.75**
T_{10}	8.5 gm of each component/pot	22.00**	23.60**	6.00ns	13.00ns	4.00**	9.00**	4.78**	3.03**	1.72**
T_{11}	8.5 gm of each component/pot	25.80**	27.20**	6.00ns	14.00**	4.00**	9.00**	5.79**	4.63**	2.16**
T_{12}	8.5 gm of each component/pot	22.00**	23.00**	6.00ns	13.00ns	4.00**	9.00**	4.43**	3.06**	1.67**
T_{13}	17 gm / pot	21.80*	21.00ns	6.00ns	13.00ns	4.00**	9.00**	4.37**	3.44**	1.25**
T_{14}	17 gm / pot	27.90**	29.20**	5.00**	16.00**	4.00**	11.00**	7.91**	5.03**	3.51**
L.S.D. 0.05%		0.44	0.54	0.07	0.20	0.14	0.32	0.27	0.13	0.13
0.01%		0.64	0.78	0.10	0.29	0.20	0.46	0.38	0.19	0.18

*No: Number, CV: Cultivar, LSD: Least significant difference, **: Highly significant difference, ns: no significant difference. (T8, Control; T 9, composts; T 10, compost + rice straw;T 11, compost + maize stalk; T12, rice straw + maize stalk;T13, rice straw;T 14, maize stalk).*

Table 7. Effect of compost and organic fertilizers on Phytohormones of two cultivars of *Phaseolus vulgaris* (vegetative stage)

No.	Phytohormones mg/100g		
	GA3	**IAA**	**ABA**
1	16.332	7.233	14.463
2	21.033	8.934	23.721
3	11.968	9.776	20.130
4	55.012	10.291	8.902
5	43.562	10.221	3.492
6	2.888	7.028	10.451
7	64.918	24.714	4.542
8	2.546	8.054	12.611
9	5.993	9.368	16.017
10	4.131	11.122	7.232
11	21.237	16.334	7.249
12	13.344	12.921	11.648
13	4.131	1.111	11.159
14	46.202	22.185	6.967

Indol 3-acetic acid (IAA), Gibberellic acid (GA), Abscisic acid (ABA) Phaseolus vulgaris (cv. bronco.) (T_1,Control;T_2, composts; T_3, compost + rice straw;T_4, compost + maize stalk; T_5, rice straw + maize stalk;T_6, rice straw; T_7, maize stalk).
Phaseolus vulgaris (cv. paulista) (T_8,Control;T_9, composts; T_{10}, compost + rice straw;T_{11}, compost + maize stalk; T_{12}, rice straw + maize stalk;T_{13}, rice straw; T_{14}, maize stalk).

[36] reported that organic manures activate many species of living organisms which release phytohormones and may stimulate the plant growth and absorption of nutrients.

This data was directly related to leaf nitrogen content due to the action of this nutrient on the process of cell multiplication and plant organ development. Furthermore, nitrogen is a factor and considered as the characteristic constituent of functional plasma, an integral part of chlorophyll molecules, proteins, amino acids, nucleic acids, nucleotides, alkaloids, enzymes, coenzymes, hormones and vitamins [37]. It alteration in different aspect of cellular metabolisms including the content of phytohormones could be arising from the different compounds present in the used vermicompost [38].

The gibberellic acid (GA) is involved in many aspect development throughout the life-cycle of higher plants. They also mediate certain environmental effects on plant development and are signaling molecules that regulate and integrate developmental processes during the entire life-cycle of higher plants, including shoot elongation and root development [39]. Gibberellin GA signaling may enable integration of aerial and root development [40]. Result concerning the effect of organic fertilizers on fruit endogenous hormones during the experimental season. This result may be due to the use of plant growth regulators (GA3) which could lead to an increase in fruit set of deciduous trees. In addition, [41] decided the same results on citrus. Treatment maize stalks and rice straw in cv. Paulista recorded the highest yield and hormones value and maize stalks in cv. Bronco. These results are owing to the use of GA3 in plant and micronutrients, which led to an increase in fruit set, and, GA3 played a major role in enlarging fruit size. In general, these results are in line with those obtained by [42].

3.4 Effect of Organic Fertilizer on Free Amino Acid

The amino acid content in leaves exhibited difference in values in treating samples as response to organic fertilizers (Table 8). Fifteen of amino acid compositions were estimated in the shoot in vegetative stage. However, the application mixture of compost and maize or decomposed maize stalk only increased most of amino acids in two cultivars when compared to control.

The results showed that compost, the mixture of compost and maize and maize stalk decomposing only, shown the highest number of amino acids compared with the amino acid in the rest treatments.

The results agreed with [43] who showed that the increased percentage of crude protein, free amino acids and nitrate in tubers of potato increased with increasing the rate of the fertilizers. [5] reported that organic fertilizer lead to new amino acids compared with the control in wheat Also [6] reported that application of compost significantly increased the level of total free amino acid in leaves of mustard when compared to control.

The results in this investigation are in accordance with the conclusions of other researchers who found that the quantity of albumins-globulins is scarcely influenced by N nutrition. As noted previously, protein composition of the wheat grain is influenced by genotype, as well as by cultivation system and environmental conditions [44]. In other words, although increased nitrogen supply correlated significantly to an increase in all protein components, its effect on grain protein also depends on the cultivar sown, due to different uses of available soil N, especially during stem elongation. It seems that organic matter can improve the physical properties of the soil and would have caused increased root development that acted positively in more uptakes of water and nutrients [45]. In addition, our results was harmony with [46] that there were an increase of formation of amino acid and consequently protein formation.

[45] stated that the soluble proteins are increased with better N supply and favorable growth condition by treatment with organic manure.

Our results confirmed an increase of glutamine level in maize stalks and rice straw application. The supply of ammonium increased considerably the concentrations of the primary amino acids, and asparagine was the most predominant acid, followed by glutamine.

Table 8. Effect of compost and organic fertilizers on amino acid contents of two cultivars of *Phaseolus vulgaris* (vegetative stage)

Phaseolus vulgaris (CV. bronco.)								*Phaseolus vulgaris* (CV. paulista)						
Total amino acids %	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Asp	**4.262**	2.716	2.845	4.740	**3.418**	**1.895**	5.896	**2.281**	**3.973**	**4.054**	**5.063**	**4.864**	**2.686**	**5.547**
Thr	**0.710**	---	**0.564**	**0.925**	**0.715**	**0.630**	**2.805**	0.394	**0.761**	**0.694**	**0.872**	**0.782**	**0.508**	**1.134**
Ser	**0.520**	0.678	**0.598**	**2.647**	**2.283**	**0.650**	**4.736**	2.925	**4.284**	3.171	4.265	3.140	3.088	**3.614**
Gly	**1.508**	**1.830**	**1.653**	**2.190**	**2.110**	1.425	**2.565**	1.385	**2.198**	1.886	**2.457**	**2.287**	**0.940**	**2.802**
Ala	**1.804**	**1.590**	**1.653**	**2.190**	**1.872**	**1.445**	**2.282**	**1.908**	**2.064**	1.688	**2.324**	**2.265**	**1.178**	**2.387**
Val	**1.130**	**1.332**	**1.460**	**1.573**	**1.312**	**0.602**	**2.120**	0.795	1.489	**1.398**	**1.520**	**1.493**	**1.404**	**1.770**
Lle	**0.756**	**0.496**	**0.864**	**1.067**	**0.867**	**0.605**	**1.215**	**0.311**	**0.652**	**0.572**	**0.847**	**0.667**	**0.542**	**1.018**
Leu	**2.150**	**1.160**	**2.251**	**2.540**	**2.272**	**1.861**	**2.625**	1.198	**2.080**	2.502	**2.685**	**2.598**	**2.209**	**3.460**
Tyr	**0.890**	**0.350**	**0.639**	**0.972**	**0.899**	0.314	1.294	0.618	0.795	**0.876**	1.475	**1.100**	**0.681**	**1.526**
Phe	**0.805**	**0.128**	**0.588**	**1.095**	**0.828**	0.400	1.450	**0.705**	0.719	1.014	**1.312**	**1.125**	**0.980**	1.356
Lys	**0.597**	---	**0.508**	**0.835**	**0.632**	**0.470**	**0.932**	**0.402**	0.456	**0.558**	**0.710**	**0.637**	**0.391**	**1.556**
MET	0.587	0.409	**0.984**	**1.155**	**1.062**	0.096	**1.370**	**0.365**	**0.280**	**0.344**	**1.050**	**0.395**	0.043	**1.306**
Arg	2.217	**1.102**	**4.540**	**6.684**	**6.175**	1.951	**6.802**	**1.149**	**2.028**	**1.605**	**4.605**	**2.223**	1.641	**4.857**
Glu	---	**3.097**	---	---	---	---	---	---		---	---	---	---	**1.033**
His	----	-	---	**0.415**	---	---	**0.792**	-	---	---	**1.267**	---	---	---

Abbreviations of amino acids: ALA = alanine, ARG = arginine, ASP = aspartic acid, GLU =glutamic acid, GLY = glycine, HIS = histidine, ILE = isoleucine, LEU = leucine, LYS = lysine, MET = methionine, PHE = phenylalanine, PRO = proline, SER = serine, THR = threonine, TYR = tyrosine, VAL = valine.

cv. bronco (T_1,Control;T_2, composts; T_3, compost + rice straw;T_4, compost + maize stalk; T_5, rice straw + maize stalk;T_6, rice straw; T_7, maize stalk).

cv. paulista (T_8,Control;T_9, composts; T_{10}, compost + rice straw;T_{11}, compost + maize stalk; T_{12}, rice straw + maize stalk;T_{13}, rice straw; T_{14}, maize stalk).

4. CONCLUSION

Application of (mixture of compost and maize stalk and decomposed maize stalk only) were found as the most effective ones to increase of that contents of amino acid and phytohormone of two cultivars. Therefore, it could be suggested that the treated plants, with these organic residues and Nile compost increased the growth , yield and the above chemical compositions.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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