Journal of Advances and Scholarly Researches in Allied Education
Vol. 15, Issue No. 9, October-2018, ISSN 2230-7540

Comparative Study of Influence of Inorganic and Organic Fertilizers on Yield of Wheat

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Abstract – Some post-experiment procedure was planned and implemented to research on the presence of vermicompost and NPK in the dry and fresh substance yield of wheat plants. Presence of 150gm of vermicompost and 5gm of NPK per Kg soil and their interaction with one another established the best fresh and dry matter gain in 45 days old wheat plants. This experiment was very significant as the value was almost 0.01 (P = 0.01) which was higher than all other values tested earlier.

Keywords: Vermicompost, NPK, Wheat, Fresh Matter Yield and Dry Matter Yield.

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I. INTRODUCTION

For decades, green revolution in India has prompted the farmers to use varieties of pesticides and chemical fertilizers with an aim to obtain higher volumes of crops. With the passage of time the tropical soil has lost its very features due to lack of proper care and organic matters.

In this situation, the best alternative is to use all available under-utilized or unutilized biodegradable organic waste materials scientifically with an aim to convert them into compost (fertilizers/manures) within a short span. Vermicompost has been proved to be an excellent soil amendment ingredient for the main fields and nursery qualities of plants. In nature, several conditions occur when plants show some altered growth process. This could be seen in the forms of enlargement of leaf area, elongation of stem, shortening of vegetative phase, flowering of matured plants, fruiting of plants, change of photosynthetic phase, and many more.

Wheat is one of the most vital food grains in India. It is the primary staple of millions of Indians across the country. People in the north and north-west of this country are especially dependent on this food grain. Wheat is rich in vital ingredients such as proteins, carbohydrates, and vitamins. It is considered as a balanced food. India is counted among the top producers of wheat of the country. Presently, India accounts for 8.7% of world's wheat production and positioned just after Russia, the USA, and China. Wheat is known as a "Rabi Corp" in India which is sown in winter and harvested with the commencement of summer. However, this routine of sowing and harvesting may differ from one region to another due to climatic variations.

Wheat is mainly harvested in the north-western part of India such as in the states of UP, Punjab, Haryana. These three states account for more than 60% of wheat production in this country.

Wheat requires cool weather and moderate rainfall. As such, the mid-latitude grassland is suitable for wheat production. The ideal winter temperature for wheat production ranges between 10-15 degree centigrade and summer temperature 21-26 degree centigrade. Comparatively lower temperature is required at the time of sowing but as the harvesting time approaches higher temperature is necessary.

Vermiculture movement in India has been started with multiple objectives that include economical crop production, replacement of costly fertilizers, and community based waste management. It's another extended objective is poverty eradication in the rural sector. Vermicomposting simply means making of compost with the help of worms through by using worm's inherent behaviour. It helps in soil aeration that in turn promotes the distribution and survival of friendly bacteria of the system. Vermicomposte can be prepared from biodegradable city waste, market waste, farm waste, and kitchen waste. Earth worm is quite capable of organic waste management and providing plant nutrients. Vermicompost should be given the due credit as it processes and maintains soil health. For increasing productivity of the soil, it is necessary to maintain certain parameters.

It is found that apart from the various nutrients the secretions of worms as well as the other related microorganism can also help in the growth of the plants. This has engrossed the attention of both scientists as well as farmers across the world. As it is a kind of natural organic product and since it is eco-friendly no adverse effects are produced in soil or in the atmosphere. The C/N radio of vermicompost is found to be very low (16:1) than that of FYM (30:1). The effect of earthworms on plant growth is because of many reasons along with the existence of macro and micronutrients in their secretions and vermicast in substantial amounts. Some kind of particular metabolites that are produced by earthworms is accountable for stimulating the growth of the plant.

Dussere (1992) stated that vermicompost assists in improving as well as protecting the fertility of topsoil and also assist in boosting up the productivity by 40% with 20 to 60% lesser inputs (Dussere, 1992).

One of the major varieties in production methods is organic agriculture which is also very helpful to the environment. Nowadays it is very common to use the application of inorganic fertilizer. This type of fertilizer is mainly derived from numerous green wastes in agriculture. These fertilizers include flexible amounts of N, P and K and are treasured source of plant nutrients. In all the organic fertilizers vermicompost is recognized as having a considerable potential as soil modifications (Arancon, et. al., 2005).

The conversion from the orthodox method to organic and low input farming is supplemented by charges in array of soil fertility. Chemical properties will also have the great effect in soil fertility. Important changes take place both qualitatively and in quantity wise in the flow as well as in the processing of nutrients that are the outcome of the cover crops, fertilizer or manure applications and decrease or removal of synthetic fertilizers and pesticides. These are some changes that affect nutrient accessibility to crops either through subsidizing to nutrients pools directly or through manipulating the soil chemical and physical environment indirectly. Since properties of the soil are serious in finding the fertility of agricultural soils, the capability to forecast and manage their dynamics and strength in time and space will ease the conversion to organic and the practices of low input farming.

Extreme use of chemical fertilizers can also deteriorate the soil as well as the food quality as a result of the loss of organic matter of the soil in the main features of conservative forming systems that is marked in barren and semi-barren areas (Singh, et. al., 2007).

Nitrogen (N) is the nutrient which can enhance the crop production. If you can practice the management process properly it will help you to enhance nitrogen use efficiency for having enduring effects on plant and soil.

Vermicompost also helps in improving and conserving the fertility of the soil. Vermicompost conveys a dark color of soil and in this manner; it assists in maintaining the temperature of the soil. Vermicompost is a type of fertilizer used in developing the crops and all kinds of nutrient that is needed by plants are present in Vermicompost. Vermicompost is composed of 0.6-1.2% N, 0.13-0.22% P and 0.40-0.25% K. Nitrogen is found to be the most significant element for the synthesis of protoplasm. It is with the help of protoplasm that the rapid cell divisions take place and the shape and size of the plant also rely on it. It enhances the production of the grain harvest in maize and it is essential for the quality of harvest like enhanced protein in grain. It enhances the application of P and K to a considerable amount (Singh, et. al., 2003).

II. REVIEW OF LITERATURE

Vermicompost is nutritious organic fertilizer which is ironic in NPK micronutrients that have advantageous soil microorganisms such as nitrogen protective bacteria as well as mycorrhizal fungi according to (Kale and Bano, 1986).

In addition, vermicompost involves enzyme such as amylase, chitinase, and lipase which will go on to break the organic water in the soil for releasing the nutrients and making it accessible to the roots of the plants (Chaouri, et. al., 2003).

The production, as well as the usage of vermicompost in agriculture, is inexpensive with regards to the production of food and it is more eco-friendly with respect to atmosphere and soil protection. With the help of vermicomposting process, various types of organic wastes can be made into valuable vermicompost.

Bhattacharjee et al (2001) stated that the improved harvest was because of the uptake of the nutrients in paddy and application of vermicompost decreased the amount of NPK. Improved harvest owing to the solicitation of vermicompost beside chemical fertilizer for improved approval of nutrients. Vermicompost does not produce any type of adverse effect on soil, plant, and atmosphere. It enhances soil ventilation and construction thus dropping soil compaction. It also encourages healthier root development and nutrient absorption. Apart from that, it also enhances the nutrient position of soil (Lazcano and Dominguez, 2010).

Arancon et al (2004) considered the agronomic influence of vermicompost as well as inorganic fertilizers on strawberries (Fragaria ananassa) at the time when it is applied distinctly and also the grouping (Arancon, et. al., 2004). Considerably, the harvest of profitable strawberries and the weight of biggest fruit was 35% larger on plants developed

on vermicompost in comparison to inorganic manures in 220 days after moving.

Vermicompost is aerobically spoiled products of organic wastes for example cow dung and the stools of other animals, farmhouse and forestry wastes, vegetative wastes, Municipal Soil Wastes (MSW). On the other hand, cow dung was used in vermicompost in the study as it is most accessible in the rural areas. Vermicompost is inexpensive technology and is an ecologically friendly process which is used to treat degradable organic waste. It is a plant nutrient-rich, microbiologically active organic changes that happen from the connections that exist in between earthworms and other types of microorganisms at the time of decomposition procedure of organic waste (Dominguez, 2004).

The effect of earthworms on the growth of plant may be because of numerous reasons apart from the existence of macro and micronutrients. Various types of metabolites that are formed by earthworms are accountable to stimulate the growth of the plant. Vermicompost also assists to avoid the disease in plant (Rao, et. al., 2000).

Hidalgo and Pashanasi (1999) observed that vermicompost also have substantial potential for soil alterations along with other numerous organic fertilizers. That is the reason why it is required to explore the possibilities of vermicompost. It is also important to find out the possibility of supplementing the chemical manure. The vermicompost is an ideal organic source of nutrient since it is rich in macro and micronutrient and assist in enhancing the harvest.

The approval of crop manufactured can be influenced by the various source of nutrients contained in its production. In the last few years, several types of research have been performed to explain the advantageous effects of the addition of crop residue manure into the soil. The exercise increases soil by physical, chemical and biological actions and enhances crop harvest and nutritional standards.

Microbial population of N2-fixing bacteria and actinomycetes enhances by the application of vermicompost. The augmented microbial actions increase the accessibility of the amount of phosphorous and nitrogen in the soil. Vermicomposting is kind of aerobic, biological process and is capable to transform eco-friendly humus into the organic materials (Chanda, et. al., 2011).

Vermicompost stimulates to influence the microbial action of soil, enhances the accessibility of oxygen, preserving the usual soil temperature, encourages the soil absorbency and penetration of water, increases the content of nutrient as well as increase the progress, harvest and excellence of the plant (Arora, et. al., 2011).

Fertilizers and organic fertilizers play an essential role in enhancing the manufacture, enhancing the excellence of vegetables and supporting soil fertility. Organic manures involve all the nutrients which are needed for vigorous growth of crop and which assist in enhancing the physical, chemical as well as biological properties of soil (Halkatti and Nagnur, 1997).

Nitrogen, phosphorus, and potassium are very common types of nutrients and play a leading role in the growth and development of all species of plant. Nitrogen is an essential part of the plant, for example, chlorophyll, amino acid, protein, and pigments. Nitrogen makes leafy vegetables as well as fodder additional succulent. It also enhances the amount of protein in food and feed. As a result, proper care should be taken to these nutrients at the time of planning a project on plant nutrition (Khalil, 2006).

Vermicompost involves 'humus' emitted by worms are evidently dissimilar from other types of organic fertilizers. Many years are required for soil or any type of organic matter for decomposing the hummus while earthworm discharges humus in its excreta. Plants will not be able to grow or survive without humus. There are four main ways by which the humic and fulvic acids in humus plays an essential part in the plants. They are:

- It enables the plant to extract nutrients from the soil.
- It also assists in dissolving the unresolved mineral for making the organic matter prepared for plants to use.
- It stimulates the growth of the root.
- It helps plants in overcoming the stress. The existence of humus in soil even assists the chemical fertilizers to work in a superior way.

Growth enhancers of the plant are usually organic compounds which can enhance or change of the growth of the plant. Growth regulators can be called as the new generation of agrochemicals. If the growth regulator is added in a lesser amount just like the foliar sprays, then also it has the capacity to change the normal growth from seed propagation to senescence in the crop plants. The usage of GA and NAA has substantial importance in the field of agriculture studies. Its useful effects of growth regulators on crop development, fruit yield, seed harvest as well as the quality of the seeds is seen in many cases (Manjunath, 2008).

Organic manure is modified in vermicompost and vermivash at the time when it is added to soil and it will certainly enhance the harvest and the development of plants. Length of the internodes as well as the diameter was enlarged considerably in vermicompost preserved plants than in GA and NAA preserved plants. The rise in diameter of internode can enhance the circumference of the plants. The observations found in the current research are kept in accordance to that of the previous reports (Agarwal, et. al., 2003).

Reddy and Ohkura (2004) said that Vermicomposting of rice are made with the help of three classes of earthworms. These three classes of earthworms are Personal excavates Perrier, Octochaetonaphillotii (Michaelsen) and Octonochaetarosea (Stephenson). Vermicompost created with the help of the three species of earthworms are varied in their nutrient concentrations. But it is seen that it influenced the higher concentration of N as well as Ca than that of the usual manure. Vermicompost manufactured by P have higher concentrations than that of N, P, K, Ca and Na. The development of sorghum in the mixtures of 75% of vermicompost created by P and 25% soil is considerably higher than that of the plants developed in mixture of vermicompost.

Al-Fraihat (2016) reveals that a 40 kg mineral Nha-1 and a compost 30m3 combination is recommended so that the total bulb yield maximizes along with an improved quality of bulb yield. This accounts to a leveraged shelf life and also causing a reduction in the need for an N-fertilizer nearabout by 75%. This in all reduces the Jordan's environmental pollution.

Janet et al (2016) states that the outcomes are proportional directly to the girth of stem as the highest value of the same are recorded by the manure of poultry. This research suggests the use of fertilizers produced naturally as a product that is largely safe for the consumption of humans. This is turn brings about a reduction in the effects of the crop produced in organically.

As per Madan and Rathore (2015), the nutrient analysis suggested that the compost pH was higher than vermicompost where's the capacity to hold water is comparatively lesser. Several other nutrients such as the phosphorus, nitrogen, calcium, organic carbon, organic matter and magnesium are found to be considerably higher in the vermicompost. Hence the same is more nutrient and has organic manure that is cheaper. The conducted experiment has a dual setup with compost and the vermicompost concentration of 20% and 40% and also the triplicates of both. The above experiment suggests that the results indicate that application of 40% conc of vermicompost would lead to a better health of the plants. The germination percentage was high with vermicompost concentration of both 20% & 40%. Root biomass, length of root shoot, free shoot, the dry weight of both root and the shoot, along with the carotenoid, and chlorophyll is comparatively high in the vermicompost treatment. An efficient amendment to the soil is the vermicompost. It helps boost the characteristics of the soil, biological properties, and the crop growth by increasing the activity, microbial biomass and also the macronutrients supply.

As per Kafle and Sharma (2015), in the domain of the study of plant growth, content nutrient, yield characteristics as well as the uptake has been recorded. Total leaves quantity, index of leaf area, content of chlorophyll, and the content of leaf nitrogen, has been found to rise periodically by the application of yard manure of farm, and the nitrogen. The increment in the uptake of nutrient via the phosphorus, nitrogen, and potassium intake along with the uptake of the micronutrient by grains has been found to rise by increased levels of nitrogen, the yar manure of farm. The variable of growth is related to the yield. However, a negative relation is a found between the growth, variables of yield and the content of micronutrient.

Kashem et al (2015) gave an explanation for the tomatoes growth performance is better in the vermicompost pots of amended soil, as compared to the growth of plants in pots of amended soil by inorganic fertilizer.

Jigme et al (2015) stated that the inorganic fertilizers head yield is significantly higher over the treatment organically. However, no significant difference exists in the 200ml CMT or the compost treatment and the inorganic fertilizer.

As per Raha (2015), the vermicompost is rich in nutrient, amendment of microbiological organic elements. This is the outcome of the interaction amidst the microorganisms and the earthworms during the organic matter breakdown. It is found to be stabilized, material that is finely divided and is peat like. This has a lesser ratio of C: N, greater porosity, higher capacity to hold water owing to the nutrients present in plants. Vermicompost is NPK rich and has micronutrient, enzymes and hormones, and humic acid. It is seen that inducing vermicompost has an impact on the plants physical properties. The vermicompost that is of the animal origin and induced in the soil traditional base has a positive relationship with the dry and fresh shoot weight. The number of leaf, disease resistance, flowering time, weight, size, and flower duration as compared to the control media.

An excellent substitute for the commercial fertilizers is the vermicompost, and is found to have greater concentration of NPK as compared to the heap manure. Using vermicompost has a significant impact on the growth of plants in ways that is not feasible to be linked with the chemical and physical properties. But the improved chemical as well physical structure leads to a better growth of the

plant. The experiment of field as laid in the design of the spilt plot having factorial designs and with four significant replication. Vermicompost levels as included in the treatment is the main plot (0, 4, 8, 12 t/ha) and the subplot being (7000 and 704). Variance analysis suggests that the impact of vermicompost and its variety is significant (Halkatti and Nagnur, 1997).

Saikrithika et al (2015) gave an explanation stating that the organic waste breakdown leads to the formation of the vermicompost. This leads to the diversity of the microbes and also the nutrient it has support the plant growth by vermicomposting. This leads to its popularity in recycling of the waste that is organic, supply significant nutrient for the growth of plants etc. The above study has been conducted to explore the substrate effect such as the pith, waste of kitchen, and production of rice straw.

Vermicompost is excellent for bio fertilizers and reflect better performance in the Vinca rosea cultivation by the coir pith vermicompost.

Sharma and Agarwal (2014), explains that the Earthworms, and its corresponding cast is efficient to produce excellent crops that is original both in quality and the quantity (Sharma, and Agarwal, 2014). This provides excellent benefits in the society by producing foods that are chemical free, nutritive and health protective and also protects both flora and flauna.

As per Priya and Santhi (2014), two species of vermicompost are cultivated namely the Eudrilus eugeniae & Lampito mauritii. The impact of the above two has been explore by three amaranthus plants namely Solanum nigrum, Hibicus cannabinus and Trigonella foenum graceum. Several studies on plant growth in relation to the soil control and vermicompost has been examined uptil flowering. The growth of plant in E. eugeniae depicts better results when compared to the L. maeritii with soil control. E. euginae is used for improvement of soil fertility and also vermicomposting.

III. MATERIAL AND METHODS

Wheat was seen to be cultivated in 8” flower pots made of clay with a drainage hole in the center. Soil has been retained in the clay pot using glass wool pads that is placed under the rim of the watch glass inverted and is above the drainage hole.

After this, the seeds of the emergency plants were subtly thinned to obtain a uniform number in every pot with doing thinning when desirable. 3 black arrangements of the pots.

Doses of both the organic and the inorganic treatment of fertilizers will be

T_1	Control
T_2	1 g NPK/kg soil
T_3	2 g NPK/kg soil
T_4	5 g NPK/kg soil
T_5	10 g NPK/kg soil
T_6	15 g NPK/kg soil
T_7	50 g Vermicompost/kg soil
T_8	100 g Vermicompost/kg soil
T_9	150 g Vermicompost/kg soil
T_{10}	1 g NPK/kg Soil + 50 g Vermicompost/kg soil
T_{11}	1 g NPK/kg Soil + 100 g Vermicompost/kg soil
T_{12}	1 g NPK/kg Soil + 150 g Vermicompost/kg soil
T_{13}	2 g NPK/kg Soil + 50 g Vermicompost/kg soil
T_{14}	2 g NPK/kg Soil + 100 g Vermicompost/kg soil
T_{15}	2 g NPK/kg Soil + 150 g Vermicompost/kg soil
T_{16}	5 g NPK/kg Soil + 50 g Vermicompost/kg soil
T_{17}	5 g NPK/kg Soil + 100 g Vermicompost/kg soil
T_{18}	5 g NPK/kg Soil + 150 g Vermicompost/kg soil
T_{19}	10 g NPK/kg Soil + 50 g Vermicompost/kg soil
T_{20}	10 g NPK/kg Soil + 100 g Vermicompost/kg soil
T_{21}	10 g NPK/kg Soil + 150 g Vermicompost/kg soil
T_{22}	15 g NPK/kg Soil + 50 g Vermicompost/kg soil
T_{23}	15 g NPK/kg Soil + 100 g Vermicompost/kg soil
T_{24}	15 g NPK/kg Soil + 150 g Vermicompost/kg soil

Plants fresh weight has been measured using a digital electronic balance and then the same has been expressed in grams.

Determination of the yield of dry matter by first drying and then chopping with the samples of mixed plants in drought oven forced at 65°C and for 24 hours to the constant weight.

IV. RESULT & DISCUSSION

The vermicompost and the NPK interaction's influence on the composition and the growth of the wheat plants in the pot culture of soil have been performed.

A. Fresh Matter Yield of Roots of 45 days old wheat plants: (Table-1)

The root’s yeild of fresh matter of the wheat plants that are 45 days old was increased when the vermicompost level rises to 150 kg.

This yield increase is seen significant at 50, 100, and at 150kg with P=0.01. This is also when 50 is over control, 100 chosen over 50 and similarly 150kg over 50.

Also, the increase of levels of NKP is increased upto 5g NPK/kg soil when the roots yield of fresh matter increases with respect to wheat plants that are 45 days old. If the levels of NPK increased further, it led to decrease 45 day old wheat plants fresh matter yield. Hence the maximum yield is when NPK is 5g.

Hence, for the wheat plants that are 45 days old, the highest value for the yield of the fresh matter is obtained when NPK level is 5g and vermicompost

is 150kg. This value is observed to be the most significant that is P = 0.01 when compared to all other different levels.

The vermicompost value of 150g vermicompost/kg soil and the NPK level at 5g NPK/kg soil along with the interaction as 150g vermicompost/kg soil x 5 g NPK/kg soil shows the maximum value for the yield of the fresh matter for roots that are 45 days old.

B. Fresh Matter Yield of Tops of 45 days old wheat plants: (Table-2)

Increase in the total vermicompost boosts the yield of tops of the wheat plants that are 45 day old. The maximum value for the tops fresh matter yield is at 150 kg vermicompost/kg soil and this is the most significant value as obtained in comparison to all different tested variables.

Increase in the total NPK at a maximum of 5g boosts the yield of tops of the wheat plants that are 45 day old. The maximum value for the tops fresh matter yield is at 5g NPK/kg soil and this is the most significant value as obtained in comparison to all different tested variables.

The interaction as 150g vermicompost/kg soil x 5g NPK/kg soil shows the maximum value for the yield of the fresh matter for tops that are 45 days old. The maximum value differ from the values of significant other interaction's as 150g vermicompost/kg soil x 2g NPK/soil, and also the 100g vermicompost/kg soil x 5g NPK/kg soil.

The vermicompost value of 150g vermicompost/kg soil and the NPK level at 5g NPK/kg soil along with the interaction as 150g vermicompost/kg soil x 5 g NPK/kg soil shows the maximum value for the yield of the fresh matter for tops that are 45 days old.

C. Dry Matter Yield of Roots of 45 days old wheat plants: (Table-3)

Increase in the total vermicompost boosts the yield of roots of the wheat plants that are 45 day old. The maximum value for the roots of dry matter yield is at 150 kg vermicompost/kg soil and this is the most significant value as obtained in comparison to 0 or 50 or 100 vermicompost/kg levels of soil.

Also, the increase of levels of NPK is increased upto 5g NPK/kg soil when the roots yield of dry matter increases with respect to wheat plants that are 45 days old. If the levels of NPK increased further, it led to decrease 45 day old wheat plants dry matter yield. Hence the maximum world is when NPK is 5g. This value is comparatively higher than the control value at P=0.01 and much higher at P=0.05. However, it does not depict major difference at NPK = 1, 2,15kg.

The interaction as 150g vermicompost/kg soil x 5g NPK/kg soil shows the maximum value for the yield of the dry matter for roots that are 45 days old. This value reflected prominent difference P=0.05 with control interaction and at 0g vermicompost and 1g of NPk. The maximum value differ from the values of significant other interaction's as 150g vermicompost/kg soil x 2g NPK/soil, and also the 100g vermicompost/kg soil x 5g NPK/kg soil.

The vermicompost value of 150g vermicompost/kg soil and the NPK level at 5g NPK/kg soil along with the interaction as 150g vermicompost/kg soil x 5 g NPK/kg soil shows the maximum value for the yield of the dry matter for roots that are 45 days old.

D. Dry Matter Yield of Tops of 45 days old wheat plants: (Table-4)

Increase in the total vermicompost boosts the yield of tops of the wheat plants that are 45 day old. The maximum value for the tops of dry matter yield is at 150 kg vermicompost/kg soil and this is the most significant value (P=0.01) as obtained in comparison to all other vermicompost level tested.

Also, the increase of levels of NKP is increased upto 5g NPK/kg soil when the tops yield of dry matter increases with respect to wheat plants that are 45 days old. If the levels of NPK increased further, it led to decrease 45 day old wheat plants dry matter yield. Hence the maximum yield is when NPK is 5g.

The interaction as 150g vermicompost/kg soil x 5g NPK/kg soil shows the maximum value for the yield of the dry matter for tops that are 45 days old. The maximum value differ from the values of significant other interaction's as 150g vermicompost/kg soil x 2g NPK/soil, and also the 100g vermicompost/kg soil x 5g NPK/kg soil.

The vermicompost value of 150g vermicompost/kg soil and the NPK level at 5g NPK/kg soil along with the interaction as 150g vermicompost/kg soil x 5 g NPK/kg soil shows the maximum value for the yield of the dry matter for tops that are 45 days old.

Vermicompost is found to have a greater impact on the parameters for growth of plants. The current results are in lieu with the study of Pritam et al (2010).

It is necessary for the final yield and dry matter that the development and growth of plant is optimal. To attain this, significant nutrient amount must be applied to the soil through the organic and the inorganic sources. It is seen that the weight of the vermicompost and the plant nutrient organic source is better in the plants that are treated by vermicompost as the one that is control treated.

Table -1

Effect of interaction Vermicompost and NPK on growth of wheat plants

g Fresh matter yield of roots of 45 days old wheat plants

g NPK/kg soil	g Vermicompost/kg Soil				Total
	0	50	100	150	
0	2.62	3.08	3.31	3.48	12.49
1	2.72	3.26	3.60	3.65	13.23
2	3.22	3.34	3.74	3.96	14.26
5	3.40	3.52	4.05	4.41	15.38
10	2.79	2.99	3.27	3.35	12.40
15	2.30	2.52	2.61	2.81	10.24
Total	**17.05**	**18.71**	**20.58**	**21.66**	**78.00**

LSD	P = 0.05	P = 0.01
Vermicompost	0.07	0.10
NPK	0.08	0.12
Vermicompost x NPK	0.16	0.22

Table -2

Effect of interaction Vermicompost and NPK on growth of wheat plants

g Fresh matter yield of Tops of 45 days old wheat plants

g NPK/kg soil	g Vermicompost/kg Soil				Total
	0	50	100	150	
0	4.38	6.04	7.02	7.51	24.95
1	6.58	6.93	7.84	8.31	29.66
2	7.48	7.95	8.60	9.03	33.06
5	8.00	8.76	9.21	9.55	35.52
10	5.45	6.13	7.27	8.05	26.90
15	4.05	4.55	5.15	6.40	20.15
Total	**35.94**	**40.36**	**45.09**	**48.85**	**170.24**

LSD	P = 0.05	P = 0.01
Vermicompost	0.26	0.35
NPK	0.32	0.44
Vermicompost x NPK	0.58	0.80

Table -3

Effect of interaction Vermicompost and NPK on growth of wheat plants

g Dry matter yield of roots of 45 days old wheat plants

g NPK/kg soil	g Vermicompost/kg Soil				Total
	0	50	100	150	
0	1.25	1.39	1.43	1.62	5.69
1	1.26	1.41	1.52	1.64	5.83
2	1.35	1.43	1.53	1.65	5.96
5	1.36	1.45	1.54	1.66	6.01
10	1.34	1.40	1.49	1.56	5.79
15	1.33	1.36	1.46	1.53	5.68
Total	**7.89**	**8.44**	**8.97**	**9.66**	**34.96**

LSD	P = 0.05	P = 0.01
Vermicompost	0.17	0.23
NPK	0.21	0.29
Vermicompost x NPK	0.38	0.53

Table -4

Effect of interaction Vermicompost and NPK on growth of wheat plants

g Dry matter yield of Tops of 45 days old wheat plants

g NPK/kg soil	g Vermicompost/kg Soil				Total
	0	50	100	150	
0	1.87	2.38	2.76	3.01	10.02
1	2.61	2.75	3.11	3.29	11.76
2	2.93	3.15	3.41	3.57	13.06
5	3.21	3.46	3.68	3.83	14.18
10	2.13	2.51	2.91	3.31	10.86
15	1.67	1.83	2.12	2.58	8.20
Total	**14.42**	**16.08**	**17.99**	**19.59**	**68.08**

LSD	P = 0.05	P = 0.01
Vermicompost	0.06	0.08
NPK	0.09	0.12
Vermicompost x NPK	0.15	0.20

V. CONCLUSION

So the pot experiment concluded that the level of NPK and vermicompost as 5g and 150g along with the interaction of the both would reflect maximum value for both dry and fresh matter yield for the wheat that are 45 day old.

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