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Effect of Earthworm on Lettuce Production Through the Recycling of Organic and Bio-Compost Production

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Abstract

Lettuce is one of the most abundant leafy vegetables and is consumed in its raw form by humans, all over the world. This study was conducted in one of the fields in the district of Al-Garmah City, Iraq to know the effect of some of the fertilizer (Animal, Chemical, and Compost fertilizer). The crop of lettuce for August 2017 to March 2018 used class Paris Island and was a two-stage experience. The experiment was carried out in two stages. The first phase included the multiplication of the earthworm and the production of the worm (vermicompost). The second phase included the cultivation of lettuce in three replicates with ten coefficients and additions of animal fertilizer, vermicompost, chemical fertilizer (NPK). The results shows that the highest productivity was the lettuce plant in vermicomposts second with level recommendation half of the fertilizing, and second-ranked vermicompost only the second level and was the third place in the recommendation vermicompost 1/2 second with level waste sheep 1/2 second level. The following percentages were then obtained sequentially (T5), (T8), (T3), (T9), (T7), (T2), (T1). Through the results of the experiment we conclude that the production of vermicomposts for being environmentally and hygienically and resulting crops are more healthy for the consumer. More research is needed to fully understand the ecology of different earthworm species, their interactions and their potential roles in promoting more sustainable farming systems.

Keywords: Lettuce; Earthworm; Vermicomposts; Organic

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Introduction

In recent years changes in lifestyle and eating habits have led to growth and popularity in fresh vegetables. The current high demand for fresh vegetables is the result of consumers' desire to obtain healthy, comfortable, new and ready to eat items. Among the different production methods, 'lettuce' form is a growth in the viability of processed vegetable products to a minimum. These are all shown as whole leaves, 8-12 cm in length, with only one very small section exposed to oxidation, thus increasing life after harvest, where the consumer desires soft lettuce leaves in the center of lettuce [1]. Vegetables are the largest dietary source of nitrates; lettuce is one of the leafy vegetables that accumulate the most nitrates in it [2]. The amount of nitrate accumulation depends on genetic and environmental factors and agricultural techniques used [3]. It is known that the floating system can be used to produce vegetables with low levels of nitrate using different cultivation techniques, but it is also interesting to know whether it can be used to induce doses of N in nutrient solution without affecting plant growth. In this way a final product with a similar yield and with less nitrate content. Start thinking about returning to clean farming systems began in recent years when people realized the damage caused by the misuse of chemical fertilizers and pesticides on the environment, public health and food safety for human consumption. Many diseases such as kidney, liver, cancer and other serious diseases have emerged. On the development of new agricultural strategies and environmentally friendly technologies, the most important of which is the clean agriculture technology represented by organic and bio-agriculture, which is based on organic fertilizers, bio-fertilizers and biological pest control. Yoke in all countries of the world, as well as the economic cost of fertilizers and chemical pesticides.

Because of the increase and high prices of chemical fertilizers very much and this will reduce the profits of farmers in addition to

the health damage caused by chemical fertilizers on both health and the environment. Therefore, it is necessary to know the best ways to produce healthy and environmentally sound fertilizers. It was necessary to know the best and low-cost methods to increase productivity in order to increase the income of farmers and increase the national income in general [4]. Meanwhile, the study [5], which referred to the effective role of earthworms, increased the productivity of the crop and the lowest seasonal cost. It has been studied that compost fertilizer is healthy and environmental security, which requires attention to increase the productivity of farmers and encourage farmers to use it to increase the productivity of their crops in addition to reducing the cost to produce these crops and thus increase income for farmers [6].

The study indicates that the methods of multiplication and propagation of earthworm are not difficult and are simple methods and do not rise to the exact scientific methods and can be multiplied by agricultural fields significantly by providing appropriate food for them that encourages the earthworm to reproduce through the provision of the appropriate atmosphere for its reproduction [6].

Objectives of the Study

This study is important because it is the first study in Iraq to evaluate and multiply the soil worm and indicate its importance to the soil and to increase the productivity and objectives of the study include the following points:

1. To know how to multiply and multiply the worm in the agricultural land.
2. To know the effect of the earth's worm on changing soil properties and their permeability.
3. Knowledge of the effect of soil worm residues (vermicomposts) on increasing productivity of lettuce.
4. To know the best ways to produce beneficial organic matter in the soil and plant.
5. To know the appropriate fertilizer recommendations with compost to increase the productivity of lettuce.

Materials and Methods

The data were analyzed for all studied properties according to the RCBD analysis using a least significant difference (L.S.D) test at a probability level of 0.5. The land of the experiment was chosen in the district of Karma, 17 districts, or a large piece of land close to the judicial center and the area of 2500 square meters was plowed and softened the land in a suitable manner and designed a trial of three replicates for each design to test and compare the use of chemical fertilizer and animal manure and the use of worm residue (vermicomposts) to find the appropriate recommendations and the best with the least cost and high productivity of lettuce farmers.

Samples were taken from the soil before planting, representing the field, dried with an antenna, and passed by a wooden hammer. It passed and then passed on a 2 mm diameter sieve. After that, some physical and chemical properties of the soil. That explained in **Table 1** for experiment coefficients.

Results and Discussion

Effect of transactions used on some morphological characteristics and leaf lettuce

The results of **Table 2** indicate significant differences in the coefficients of all head height ratios of the lettuce plants growing in different fertilizers. T6 was the highest increase rate, with a rate of 36 cm, followed by T4, 35 cm, T10, 34 cm, T5, T3, 8T and T9 respectively at 33, 32, 32, 32 and 31 cm respectively. The lowest rate of 30 cm compared to the treatment of the first treatment comparison, where the rate of rise was lower than the rest of the transactions was 26 cm. The results of **Table 2** showed that the highest weight of the head of lettuce was in the sixth treatment (T6), which gave a weight of 1280 g. This is due to the fact that organic matter contains the necessary elements for the growth of lettuce to give weight and ideal growth highest yield of the plant was 36 cm and the results of the study for **Table 2**. All the treatments in terms of weight of the head were significantly higher. The lowest weight of the lettuce was the first treatment (T1). T6 recorded the highest weight of the head and weighed a total of 1280 g. The treatment was then T4 and the average weight was 1235 g and was ranked third with the head weight T10 at a weight of 1210 g. T5, T8, T3, T9, T7, and T2 were subsequently replaced by consecutive weight rates of 1192, 1164, 1120, 1025, 975 and 925.

As for the edible leaves, the results of **Table 2** showed that there was a significant superiority in the number of edible leaves for the comparison treatment T1, where there were 27 edible sheets with a total estimated 71.0%. The percentage of palatable and edible leaves ranged from 42 to 2 T The ratio of the number of edible leaves to the proportion of T1 was second, with the number of edible leaves T4 and T10 followed by the treatment T5 where each was registered In parallel, 64 sheets, 62 and 57 sheets with successive percentages were also 90%, 88% and 86%. T3, T8, T9, T7 and T2 followed by consecutive papers 51, 49, 46 and 42, 83%, 82%, 82% and 82% respectively.

This is the reason for the low productivity of the T1 comparison since the soil is poor in the nutrients necessary for the growth of lettuce to give the required productivity, as well as the high gypsum soil, as demonstrated during soil analysis before planting. Therefore, it is necessary to add the necessary elements needed by the plant to grow well and ideal. This applies to the study of Basim noting that the plant lettuce needs the necessary elements of growth to increase productivity and cannot be cultivated in poor soils. These results are consistent with the addition of vermicompost to lettuce has improved the quality of the lettuce plant [7]. It has led to an increase in soft weight, head size, number of leaves, leaf length, leaf width and dry weight of the plant. With the increase in levels of vermicompost, and there was an increase in some essential elements in plants such as nitrogen, phosphorus, potassium, magnesium, and calcium, but this increase was not significant. This experiment is the first in Iraq to accurately determine the interest you can vermicomposts effect on plant growth in a positive and significant production and increase in a total crop of lettuce under different fertilizer recommendations.

Effect of the coefficients used in the rate of some physiological characteristics of the lettuce plant

Despite the great development in the laboratory equipment around the manifestations of the plant, this method is still one of the most important ways to diagnose the lack of nutrients on the plant, because each element has a certain effect or a set of effects on each plant and in the absence of this element or a drop equal to the critical limit of lack of soil Or because of interference from other elements. So during this experiment, the focus was on three major elements (nitrogen, phosphorus, and potassium) NPK.

The results of **Table 3** showed a significant increase in all experimental treatments from different fertilizer additives. Chlorophyll ranged from 0.47 mg^{-1} for T2 to 0.57 mg^{-1} for T6 treatment of Vermicompost fertilizer with high-dose chemical fertilizers and half The results of the study showed that the positive correlation between the treatments and the treatment of the soil without any fertilizer additions to the treatment T1, which recorded a rate of 0.41 mg^{-1}. T2, T7, T3, T8, T9, T5, T10 and successive values were 0.47 mg^{-1}, 0.49 mg^{-1}, 0.51 mg^{-1}, 0.52 mg^{-1}, 0.52 mg^{-1}, 0.53-0.52 mg^{-1} and finally $mg^{-1.5}$. The results of **Table 3** showed that the highest percentage of edible fat concentration was 1.95% to 3.21% for T2 and T6 respectively. The following factors were found in 4T, T10, and T5 respectively, with 2.84%, 2.68% and 2.59%. While the following treatments were ranked third with fat concentration. T7, T9, T3, T8 and 2.15%, 2.20%, 2.29%, and 2.35% respectively were the following recommendations for the compost or animal fertilizers with vermicompost. The first comparison treatment recorded soil without any fertilizer additives with the lowest percentage of oil in the leaves, which was 1.53%.

The highest concentration of nitrogen in lettuce was found to be 2.27% for T6 treatment, significantly higher than the T1 comparison, with a nitrogen content of 1.28. All fertilizer transactions also achieved a significant increase in the ratio of nitrogen in lettuce leaves to soil comparison leaves without any fertilizer additions. Nitrogen ranged from 1.54% to 2.27% for T2 and T6.

As for the phosphorus component found in the lettuce leaves, the results showed that all the study coefficients were significantly higher. The T6 showed the highest concentration of phosphorus (0.71%) followed by T4 and T10 (0.68% and 0.66% respectively). While the comparison treatment T1 was recorded for the recommendation without any additives with the lowest concentration of phosphorus and its value was 0.32%, where the wide difference between the comparison treatment without fertilizer additions and the rest of the treatments with different fertilizer recommendations of chemical fertilizer with vermicomposts fertilizer and animal fertilizer and different rates. The treatment was recorded by recommending the chemical

Table 1 Experiment cofficient.

Items	Additions	Type of Transaction
T1	Without additions	Comparative treatment (soil only)
T2	120 kg dab/acre	Chemical fertilization (full celestial recommendation of lettuce plant)
T3	Vermicompost 2 tons/acre	Vermicompost only the first level
T4	Vermicompost 4 tons/acre	Vermicompost only the second level
T5	Vermicompost 2 tons+60 kg dap/Acre	Vermicompost first+level recommendation half of the fertilizing
T6	Vermicompost 4 tons+60 kg Dab/Acre	Vermicompost second+level recommendation half of the fertilizing
T7	Waste sheep 2 tons/acre	Animal fertilizer (waste sheep first level)
T8	Waste sheep 4 tons/acre	Animal fertilizer (second level sheep waste)
T9	Vermicompost 1 ton/acre+waste sheep 1 ton/acre	Vermicompost 1/2 first+level waste sheep 1/2 first level
T10	Vermicompost 2 tons/acre+waste sheep 2 tons/acre	Vermicompost 1/2 second+level waste sheep 1/2 second level

Table 2 Effect of the transactions used in the physiological rate of leaf lettuce.

No	Head height (cm)	Percentage of edible leaves %	Percentage of edible leaves %	Total leaves	The weight of Head (g)
T1	26	71	71	38	530
T2	30	77	77	54	925
T3	32	83	83	61	1120
T4	35	90	90	71	1235
T5	33	86	86	66	1192
T6	36	90	90	73	1280
T7	31	82	82	56	975
T8	32	85	85	64	1164
T9	32	84	84	58	1025
T10	34	88	88	70	1210
LSD. 0.05	2.453	3.204	3.204	8.813	117.9

fertilizer at the last penultimate level i.e. after the treatment of the comparison and recorded a concentration of phosphorus 0.46%. The following treatments were carried out sequentially in terms of the ratio of phosphorus in lettuce and were for T7, T9, T3, T8, T5, and T10, and phosphorus concentrations were 0.49%, 0.50%, 0.51%, 0.58%, 0.60%, 0.60% and 0.68%.

The results of **Table 3** showed that the concentration of potassium was highest in T6 and recorded a concentration of 3.83%, followed by T4, T10, and T5 respectively. The total concentration of potassium was 3.22%, 3.19% and 3.16%, which represents the fertilizer recommendations of Vermicomposts and animal manure. While the following treatments came in the second phase with potassium concentration in lettuce leaves. The T8, T9, T3, and T7 were exchanged with successive values of 2.91%, 2.81%, 2.35% and 2.15%. Many Research have been done on the effect of Vermicomposts on the growth, yield and quality of tomatoes in 15%, 30% and 45%. Vermicomposts of soil weight, which showed a significant increase in germination rate of seeds and increase in diameter And the length of the plant and the increase in the percentage of addition, also observed a significant increase in the biomass in the soil as well as improved qualities of the quality of the share with increasing the percentage of addition of vermicomposts. It has been studied that the addition of 30% of vermicompost to the soil resulted in a significant increase in stem diameter, length of the plant, a number of leaves and flowers compared with control treatment not added to vermicompost. P, K, Ca and Mg, also reduced soil pH from 6.8 to 6.6. As well as the activation of microorganisms and increase the biomass in the soil.

Effect of the coefficients used in leaf content Cd, Cu, Mn, Zn, Fe

The results of **Table 4** showed significant differences of iron for the soil samples used after the agriculture. **Table 4** results showed that the highest (188.6, 192.1 and 183.2 mg/kg^{-1}) iron was found in T4, T6 and T10 papers on the sequence, (81.4 mg^{-1}). This indicates a significant increase in the iron content of the soil. The lowest concentration was used to treat the experiment with chemical additives, which recorded 128.3 mg kg^{-1}, as well as a reference case results of the experiment to a significant increase of the element iron soil samples used after planting transactions T3 and T5 and T7 and T8 and T9, where the successive values of 156.4 and 163.9 and 148.2 and 177.1 and 150.3 mg kg^{-1}.

The results of **Table 4** showed that the fertilizer parameters were used to increase the concentration of Zn, Mn, Cd, and Cu in the soil for the post-cultivation treatments. The highest mean concentration of zinc concentration was found to be between 48.2 and 68.0 mg/kg^{-1}. For T2 and T6, while the manganese ratio for the comparative treatment soil was no additional 40.5. The results of **Table 4** showed that the highest mean manganese concentration of T4 and T6 treatments was 79.1 and 82.1 mg/kg^{-1} in vermicompost fertilizer with chemical fertilizer additives. As for other fertilizer treatments, there was an increase in the manganese component of the soil after planting. As for cadmium, the results of **Table 4** showed an increase in the cadmium component after planting in soils used in the use of endometrial additives. The results showed that the highest percentage of cadmium was in T5 and T6, with sequential values of 0.71 and

Table 3 Transactions effect used in the physiological rate of lettuce leaves.

No	K%	P%	N%	Fat%	Chlorophyll mg g^{-1}
T1	1.55	0.32	1.28	1.53	0.41
T2	2.1	0.46	1.54	1.95	0.47
T3	2.35	0.51	1.82	2.29	0.51
T4	3.22	0.68	2.1	2.84	0.55
T5	3.16	0.6	1.95	2.59	0.53
T6	3.83	0.71	2.27	3.21	0.57
T7	2.15	0.49	1.67	2.15	0.49
T8	2.91	0.58	1.75	2.35	0.52
T9	2.82	0.5	1.71	2.2	0.52
T10	3.19	0.66	2	2.68	0.54
LSD. 0.05	0.354	0.12	0.278	0.295	0.019

Table 4 Effect of the transactions used in the content of the leaves of some 50 smaller elements (mg kg^{-1}).

No.	Cu	Cd	Mn	Zn	Fe
T1	7.4	0.62	57.4	40.5	110.7
T2	9.9	0.65	64.2	48.2	128.3
T3	10.6	0.64	71.5	56.1	156.4
T4	13.5	0.69	0.179	64	188.6
T5	11.1	0.71	73.2	59.1	163.9
T6	13.9	0.74	82.1	68.4	192.1
T7	10.2	0.69	68.4	52.1	148.2
T8	12.3	0.68	70.2	54.2	177.1
T9	12	0.66	69.6	54.1	150.3
T10	13.3	0.7	76.3	60.1	183.2
LSD. 0.05	4.751	0.228	10.33	9.26	19.65

0.74 mg kg^{-1}, On the treatment of soil comparison without any additions and the value of 0.62 mg kg^{-1}.

As for the copper component, the results of **Table 4** showed a significant effect on the treatment of soil comparison without fertilizer additions on the other fertilizers. The concentration of copper for the fertilizers, fertilizers and chemical fertilizers ranged between 9.9 and 13.9 mg/kg^{-1} for T2 and T6. The order was 7.4 mg/kg^{-1} for soil treatment without any fertilizer recommendations.

To this day cannot rely on plant analysis to diagnose the lack of micro-elements needed by the plant, especially minor elements. This is because the critical limit of each plant element is still not fully known. The form in which the element is found in the plant and the ratio of each element to the nucleus is still unclear. Quantities of an element may be seen in infected leaves larger than those found in healthy leaves. In addition to the plant requirements of any of these elements vary from plant to plant and from time to time plant during the period of his life. This experiment is the first in Iraq to determine precisely the interest in which vermicompost can affect plant growth positively and significantly increase the overall yield of lettuce in accordance with different fertilizer recommendations.

The increased nutrient availability in the soil comes from the containment of compost as well as the addition of the soil-added vermicomposts to a good proportion of the elements of iron, zinc, and manganese, as well as copper that can be extracted. As well as to the role of organic acids resulting from the decomposition of organic matter as well as the Vermicomposts produced from the fungus and decomposed into the materials absorbed by the plant. These acids compete on the surface of adsorption because they contain effective aggregates that reduce the reaction of these elements with the decomposition surfaces, as well as the role of CO_2 resulting from the decomposition of organic matter is carbonic acid, which works to reduce the pH of the soil is the most important factor in the process of adsorption, sedimentation, and reduction of phosphorus rock.

The results also showed that the increase in the iron concentration in the fertilized soil from the fertilizers and organic fertilizers was consistent with the increase in the density of microorganisms solubility of phosphate compounds in the organic fertilizers used, which have the ability to release certain substances and compounds such as the siderophore which can iron the iron, which increases the concentration of iron and other small elements such as zinc, cadmium, zinc, as well as copper in the soil. The results show that the most important role of organic fertilizer, as well as vermicomposts to the soil, increase the readiness of the zinc element in the soil by containing the ready-made zinc and its preservative role in preserving it from the transformation to the non-soil formulations [8].

The results show that organic fertilizers and vermicomposts are an important source of micro-nutrients and nutrients in the soil due to their association with organic matter. The concentration of nutrients remaining in the soil at the harvest stage is high, indicating the importance of using organic fertilizer as well as vermicomposts and the role of the actor in raising nutrient limits in the soil for subsequent crops to ensure an important part of plant requirements for nutrient needs and balance these nutrients with each other in the soil. The study showed an increased concentration of iron, zinc, cadmium, manganese, and copper extracted by higher DTPA than was found. Because of the content of the vermicomposts of these elements.

In addition, these results are consistent with when fertilizing the soil contaminated with these elements with decomposed organic materials, which reduced the effective effect of some types of heavy metals due to the vital activities of the living areas and the formation of claws, which turns the contaminated soil into an environment free of heavy metal activity. It was found through the experience [9] that the addition of fermented organic matter for a long time changes the ratio of humic acid to the benefit of the acidic humic at the expense of the Volvik, which is active by increasing the release of heavy elements. This is observed in organic fertilizers prepared locally by increasing the acidic acid in the components of organic substances prepared by decomposition [10]. These results should encourage farmers to adopt the use of vermicompost to produce vegetables free of chemical additives to be safe. As well as being less expensive than buying chemical fertilizers.

Effect of the transactions used in the content of papers Cd, Cu, Mn, Zn, Fe signal results **Table 4** that highest rate and 184.3 185.2 and 186.1 mg kg^{-1} of iron found in T9 and T10 transaction papers and T8 respectively, as moral beat iron concentration rate 163.5 and 174.2 mg kg^{-1} in leaves of treated soil Without adding the soil by adding compost DAB sequentially. Encourage farmers to adopt important using Vermicompost's to produce vegetables free of chemical additives to be safe.

Effect of the treatments used in some soil properties and content of N, P, K after planting

Table 5 shows that there is a significant effect on the reduction of pH of the soil after cultivation by the fertilizers used from organic fertilizer, vermicompost, and chemical fertilizer by recycling organic solid waste. (T6, T8, T10). The PH was lower than 7.53 for T2, which was the highest pH until T5, T9, which was the lowest pH 7.50. On the other hand, we note that there was an increase in all the treatments used in the electrical conductivity of the soil after planting. The electrical conductivity ranged from the highest value of the treatment of T6 to the value of 2.60 specimens M^{-1} and was significantly higher than the other soil level of 2.42 Demicimens M^{-1}.

Table 5 also shows a significant difference in the soil organic matter rate after planting. The percentage of organic matter was increased by 0.97% before it reached 0.99% until it reached the highest ratio of T6. The highest ratio was 2.94%. For transactions T4, T8, T10, this recorded sequentially 2.87%, 2.15%, and 2.69%.

Table 5 showed a significant difference in the total nitrogen ratio of the soil after planting for all the treatments used. The lowest total nitrogen level was recorded in T2 and 110.4 mg/kg^{-1}, which represents the treatment in which only the chemical fertilizer was used. T3, T7, and T9 were ranked second with 135.7, 127.5 and 130.4 mg kg^{-1}. The following transactions were of high value and were recorded for T4, T5, T8, and T10, with sequential values

Table 5 Effect transactions on soil properties and content items after agriculture.

No	Understudy K mgkg^{-1}	Understudy P	Understudy N	O.M	CEC	EC	pH
		mgkg^{-1}	mgkg^{-1}	%	Cmole Kg^{-1}	ds m^{-1}	
T1	105.4	10.6	91.3	0.97	16.8	2.42	7.54
T2	102.7	12.4	110.4	0.99	17.3	2.47	7.53
T3	150.5	15.2	135.7	1.95	35.9	2.5	7.52
T4	178.9	21.7	158.5	2.87	42.6	2.57	7.51
T5	151.4	18.3	147.6	1.97	36.7	2.53	7.5
T6	183.8	24.5	173.8	2.94	44.9	2.6	7.48
T7	142.7	14.1	127.5	1.66	33.4	2.55	7.51
T8	163.2	19.5	140.8	2.15	40.1	2.57	7.49
T9	148.1	15	130.4	1.78	35.2	2.51	7.5
T10	170.5	20.9	151.2	92.6	44.5	2.58	7.48
LSD. 0.05	13.21	2.269	9.82	0.132	4.807	0.127	0.84

of 158.5, 147.6, 140.8 and 151.2 mg^{-1}. The highest value of T6 was 173.8 mg^{-1}. The results of **Table 5** indicate an increase in the ratio of organic matter (OM) to all fertilizer coefficients.

The results showed that the highest increase in organic matter was recorded for treatment T6 by 2.94%, followed by T4 with a value of 2.87%. The third treatment was T10 with a total value of 2.69%. T8, T5, and T3 respectively were followed by consecutive values of 2.15% and 1.95% 1.97% and 1.95%. T7, T8, and T2 respectively were replaced by consecutive coefficients of 1.78%, 1.66%, and 0.99%, while the first treatment of soil without any fertilizer additions was 0.97%. As for electrical conductivity (EC), the coefficients were significantly higher and the electrical conductivity of the different coefficients was higher than the T1 comparison. The lowest ratio was 2.42, while the highest value of the electrical conductivity was T6 with a value of ds m^{-1} 2.60. And the second place in terms of conductivity T10 with a value of ds m^{-1} is 2.58 and came third in terms of electrical conductivity T4 and T8 with equal values ds m^{-1} is 2.57. The following transactions in sequence T7, T5, T9 and T3 with consecutive values 2.55, 2.53, 2.51 and 2.50 and ds m^{-1} is 2.47.

The results of **Table 5** on CEC showed significant differences for all fertilizer treatments. The highest value of T6 was recorded with Cmole Kg^{-1} 44.9 and T10 was treated with Cmole Kg^{-1} 44.5 and T4 was obtained with Cmole Kg^{-1} 42.6 and T8 with a value of Cmole Kg^{-1} 40.1. T5 was ranked fifth and Cmole Kg^{-1} was 36.7. The following coefficients were T3, T9, T7 and T2 respectively, respectively 35.9, 35.2, 33.4 and Cmole Kg^{-1} 17.3.

Also, the **Table 5** shows that there is a significant difference of phosphorus ready for the treatments used for soil after agriculture by recycling organic matter in the soil. Ranging from 12.4 to 24.5 mg/kg^{-1} for T2 and T6 respectively, surpassing the phosphorus level remaining in the treatment of comparative soil 10.6 mg kg^{-1}, and locally grown fertilizers contributed a good 13.7% Phosphorus prepared and remaining in the soil after planting for treatment T6 reached 173.8 mg kg^{-1}.

In **Table 5**, there was a significant effect of organic fertilizers on soil potassium uptake. The highest concentration of potassium in soil after planting was 102.7, 142.7 and 148.1 mg/kg^{-1} in T2 and T7 and T9 respectively, with the lowest concentration of potassium in the treatment of soil added to the chemical fertilizer T2, while the highest concentration of potassium for soil after the cultivation of the treatment 6 T and a high value of 183.8 mg kg^{-1}, and all cases were significantly higher than the percentage of potassium-ready soil after agriculture compared B Which was achieved in the treatment of soil comparison of 105.4 mg/kg^{-1}. Many studies indicated that Vermicomposts is a chemical and biological enrichment in relation to manure [11,12].

Furthermore, the pH of Vermicomposts used seems to exert a strong influence on the availability of these nutrients [13]. The results of the study showed that the use of organic fertilizer as well as vermicompost had a significant and significant effect on soil and biological properties, which included the percentage of organic matter, total nitrogen content, phosphorus readiness, and potassium compared with soil control. This organic effect of adding organic fertilizers and vermicomposts from the recycling of solid organic matter is due to the fact that this fertilizer contains a density of vitality and its effectiveness in the release of these nutrients from the sources of non - soluble or ready for these elements in the compost and soil components. As well as the containment of these organic substances and fertilizers on the nutrients [14]. The presence of humic organic acids in the organic fertilizer components, as well as the vermicomposts fertilizer, makes the conditions suitable for the work of nitrogen soluble phosphorus solvents and contributed to the reduction of PH and activation of the processes or the secretion of organic phosphorus enzymes with organic matter decomposition [15] and the ability of soil to decompose organic matter after cultivation.

Similarly, the phenomenon of variation in microbiology is related to the availability of organic matter and the vermicomposts from the sources of carbon and the energy it needs in its growth and increases its effectiveness. This may be attributed to the competition that can be obtained from food and window. Through the optimal use of specific factors in the environment affected by organic fertilizers prepared [16,17]. This may be due to the increase in the concentration of the potassium element to the release of H+ ion from the dissolution of organic acids, the processes of mineralization of nitrogen and the formation of ammonium, which increases the process of potassium release to soil solution and soil exchange surfaces as well as the organic fertilizer content as well as the ferment Potassium and organic fertilizer in the solubility of certain compounds and minerals bearing potassium by organic acids [18].

The study shows that the addition of vermicomposts to the soil has improved the physical properties of the soil, which is the apparent density, building, and porosity of the soil and its ability to retain water and improved vegetative growth and productivity [19]. Sridharan and Hoone showed that the addition of vermicomposts to the soil has improved its physical properties, such as its ability to retain water, increase soil temperature in the winter and reduced the soil pH [20]. The study also showed an improvement in soil fertility properties, of nitrogen, phosphorus, and potassium.

Conclusion and Recommendation

The results indicate that on average, it was nutrient grown in vermicompost contains the contents of the larger food grown without chemical or organic nutrients. It wasn't the best rate for macronutrients such as N, P and K. stock content of magnesium, iron, zinc, copper, and had lower concentration with vermicompost, which can be an advantage to use this product on traditional compost. It is important to point out that more studies are needed to assess the impact of periodic inputs and distinctive fertilization rates based on availability and nutrient content of organic fertilizers, as well as the impact of integrating organic fertilizers in the soil in the medium and long-term.

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