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The Study on Addition of Nutrient Pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and Organic Materials in Organic Fertilizer Which is Decomposed by Using Earthworms (*Pheretima peguana*)

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Abstract: The study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*Pheretima peguana*) can be classified the study into 5 sets of experiment as following: Experimental set T1: was an earthworms (*P. peguana*) habitat controller used soil and animals dung in the proportion of 10:0 kg and also used earthworms (*P. peguana*) in the amount of 0.5 kg to consume an added molasses organic waste from vegetable in the proportion of 1:15 kg mg^{-1}. Experimental set T2: was an earthworms (*P. peguana*) habitat used soil and animals dung in the proportion of 10:1 kg and also used earthworms (*P. peguana*) in the amount of 0.5 kg to consume an added molasses organic waste from vegetable in the proportion of 1:15 kg mg^{-1}. Experimental set T3 was an earthworms (*P. peguana*) habitat used soil and animals dung in the proportion of 10:3 kg and also used earthworms (*P. peguana*) in the amount of 0.5 kg to consume an added molasses organic waste from vegetable in the proportion of 1:15 kg mg^{-1}. Experimental set T4 was an earthworms (*P. peguana*) habitat, used soil and animals dung in the proportion of 10:5 kg and also used earthworms (*P. peguana*) in the amount of 0.5 kg to consume an added molasses organic waste from vegetable in the proportion of 1:15 kg mg^{-1}. Experimental set T5: was an earthworms (*P. peguana*) habitat used soil and animals dung in the proportion of 10:7 kg and also used earthworms (*P. peguana*) in the amount of 0.5 kg to consume an added molasses organic waste from vegetable in the proportion of 1:15 kg mg^{-1}. The study has found that the organic fertilizer which was decomposed by using earthworms (*P. peguana*), when mixing animals dung (chicken, pig and cow dung) with soil in order to be an earthworms (*P. peguana*) habitat that would cause the said organic fertilizer has nutrient pillar (N:P:K) and organic materials more proportionally of compost that was mixing with soil in order to be an earthworms (*P. peguana*) habitat. When the all 5 experimental sets have been brought. A nutrient pillar (N:P:K) and quantity of organic materials in the organic fertilizer that was caused by using earthworms (*P. peguana*) to decomposing. There was a found that the experimental set 5 has quantities of nutrient phosphorus, potassium and organic materials which the organic materials has the most quantity and as well has an over standard value on 2005 organic fertilizer, for the experimental sets 4, 3, 2 and 1 have orderly nitrogen phosphorus potassium and organic materials.

Key words: Nutrient, nitrogen, phosphorus, potassium, organic material, organic waste, earthworm

INTRODUCTION

Presently, the environmental impacts are the major problem for country especially the overwhelming waste problem in the city which is constantly causing more intensity, even though the government has a plan to construct incinerators and as well as making a campaign in waste categorization and buy-back in order to reuse. However, all these methods still unable to reduce waste's problems, some of the increased wastes are an organic waste from raw markets and communities which is having the amount of wastes quantity almost half of the whole quantity which is 46%, there is a various methods to decompose an organic

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waste such as burying, fertilizing and using as an animal feed but the said methods still can not solve waste problems completely. Consequently, a safe method finding for the environment especially the use of living lives that can change wastes to be an organic fertilizer which could see that earthworms can dispose organic waste especially the organic compost the has the quantity of nitrogen to be the highest compound such as raw wastes and discarded food that came from raw markets or communities.

Further more there is a found that earthworms characteristically like consuming sweet foods such as fruits also (Tunshow, 2007). But now a day, organic waste disposal by using earthworms still takes such a long period of time in decomposing then as the said reasons need to build up a related knowledge via this research by using the earthworms (*P. peguana*) in disposing an organic waste from vegetables which the experimental vegetable wastes will be added molasses as a mixture in the proportion of 1 kg per molasses 15 mg in order to increase efficiency of earthworms (*P. peguana*) to be quicker in the organic wastes disposal. According to the organic waste disposal method by using earthworms (*P. peguana*) is able to bring an organic waste that was decomposed by earthworms (*P. peguana*) to be used as fertilizer in developing soil quality to be better due to the fact that an organic waste decomposition result would cause a nutrient pillar that is crucially to the vegetation as Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials which are beneficial for the vegetation growth. In the other hands, the organic fertilizer that was decomposed from organic waste only still has a crucial nutrient pillar for vegetation growth in the less amount when compare to The Land Development Department's nutrient pillar chart. Therefore, the researcher then brought the animals dung (chicken, pig and cow dung) mixed with soil in order to be an earthworms habitat and increment of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials for the organic fertilizer which came from organic waste decomposition by using earthworms (*P. peguana*).

Research objective: The research objective of addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) research objective to educate the quantities of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is caused from raw vegetable waste decomposition by using earthworms (*P. peguana*) and compare the quantities of main nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) in organic fertilizer that was caused in each experimental sets of raw vegetable waste decomposition by using earthworms (*P. peguana*).

Research hypothesis: The usage of animals dung (chicken, pig and cow dung) mixed with soil to be an earthworms (*P. peguana*) habitat would make fertilizer that is caused from raw vegetable waste decomposition by using earthworms (*P. peguana*) to be increased a major nutrient pillar (N:P:K) and organic materials.

Research boundary: The study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) has a research boundary is to educate an addition of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) by mixing animals dung with soil that is an earthworms habitat in various proportions of compost 10:0, 10:1, 10:3, 10:5 and 10:7 kg kg^{-1} and compare Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) in each experimental sets.

MATERIALS AND METHODS

The study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) has a research method as following:

Organic waste preparation: The organic waste has been brought from raw market, Mueang district, Mahasarakham province and chopped them into a small pieces which is in the size of 0.5 inches in order to reduce time duration in decomposing because when organic waste has small sizes then there would be more surface area which helps to decompose quite quickly and also earthworms (*P. peguana*) would be able to dispose an organic waste quickly because they like to consume the organic waste which already become rotten and decompoed to be a liquid (Arnut, 2007).

Earth soil preparation in order to be an earthworms habitat: Animals dung (chicken, pig and cow dung) have been brought to mix in the proportion of 1:1:1 kg and mix with earth soil which is an earthworms (*P. peguana*) habitat in the various proportions of 10:0, 10:1, 10:3, 10:5 and 10:7 kg kg^{-1} and leaves them to reach the temperature under 28°C because the earthworms (*P. peguana*) are very like living in temperature span between 15-28°C.

Study method: The study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) has 5 experimental set patterns by having each repeatedly tested for 3 times in order to find the pattern of experimental set which has the most quantity of major nutrient pillar (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*).

Experimental set T1: This was an earthworms (*P. peguana*) habitat controller using earth soil mixed with animals dung in the proportion of 10:0 kg kg^{-1} and used the earthworms (*P. Peguana*) in the amount of 0.5 kg to consume rawvegetable waste that mixed with molasses in the proportion of 1:15 kg mL^{-1}.

Experimental set T2: This was an earthworms (*P. peguana*) habitat using earth soil mixed with animals dung in the proportion of 10:1 kg kg^{-1} and used the earthworms (*P. peguana*) in the amount of 0.5 kg to consume raw vegetable waste that mixed with molasses in the proportion of 1:15 kg mL^{-1}.

Experimental set T3: This was an earthworms (*P. peguana*) habitat using earth soil mixed with animals dung in the proportion of 10:3 kg kg^{-1} and used the earthworms (*P. peguana*) in the amount of 0.5 kg to consume raw vegetable waste that mixed with molasses in the proportion of 1:15 kg mL^{-1}.

Experimental set T4: This was an earthworms (*P. peguana*) habitat using earth soil mixed with animals dung in the proportion of 10:5 kg kg^{-1} and used the earthworms (*P. peguana*) in the amount of 0.5 kg to consume raw vegetable waste that mixed with molasses in the proportion of 1:15 kg mL^{-1}.

Experimental set T5: This was an earthworms (*P. peguana*) habitat using earth soil mixed with animals dung in the proportion of 10:7 kg kg^{-1} and used the earthworms (*P. peguana*) in the amount of 0.5 kg to consume raw vegetable waste that mixed with molasses in the proportion of 1:15 kg mL^{-1}.

Experimental sets were watered in every 2 days and used a liter of water each time in order to make more humidity for the earthworms until the organic waste would be completely decomposed and observed biological characteristic of the organic waste till became an organic fertilizer.

RESULTS AND DISCUSSION

The study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) has found that the usage of animals dung (chicken, pig and cow dung) mixed with earth soil that is an earthworms (*P. peguana*) habitat would cause fertilizer which was caused from raw vegetable waste decomposition by using earthworms (*P. peguana*) has increased Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials which accordingly to the added fertilizer proportion which mixed with earth soil. When brought all 5 experimental sets to compare the quantities of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) found that the experimental set T5 has the most quantities of major nutrient pillar and organic materials and secondly is the experimental set T4, T3, T2 and T1 orderly as shown in Table 1.

From the Table 2, the usage of mixture between animals dung (chicken, pig and cow dung) and earth soil which is an earthworms (*P. peguana*)'s habitat has quantitatively increased a major nutrient pillar (N:P:K) and organic materials which is accordingly to the proportion of the added compost to be a mixture with earth soil.

From the study we will see that the experimental set T5 has the most quantity of nutrient pillar and organic materials because the experimental set T5 which is an earthworms (*P. peguana*) habitat has mixture of earth soil and mixed dung in the proportion of 10:7 kg kg^{-1} which is having total N 0.63 + -0.029% P 0.63 + -0.017% K 0.59 + -0.030% and OM 28.79 + -0.321%. From the Table 1 it is shown that the experimental set T5 has the most quantity of nutrient pillar. Total N 0.77±0.015, P 0.65±0.003, K 0.60±0.006 and OM 52.12+-0.006%.

For the experimental set T1-4 has a lower quantitative value of nitrogen, phosphorus, potassium and organic materials according to the proportion of the mixture between earth soil and mixed animals dung. The result of the experimental set T5 has been brought to compared to a standard value of organic fertilizer and found that there were quantitative values of phosphorus, potassium and organic materials which in the standard of organic fertilizer has an appropriate characteristic for vegetation growth because the organic fertilizer has a loosely characteristic, dark brown color, light weight, porous which is able to greatly drain water, capable to highly contain dampness and has a very high quantity of organic materials. Consuming into their intestines and by the activity of microbe in their intestines and gastric juice help changing the various nutrient pillar in organic materials to be usable for vegetation such as to changing nitrogen to be in the beneficial form of saltpeter or ammonia phosphorus and potassium that is in the changeable form which correspond to Nookaew (2006) study who studied the quality and quantity comparison of earthworms dung fertilizer which was caused from a various organic waste

Table 1: The quantities of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in the organic waste which was already decomposed by the earthworms (*P. peguana*)

Experimental set	Total N (%)	P (%)	K (%)	OM (%)
T1	0.07±0.006	0.23±0.015	0.18±0.010	15.94±0.012
T2	0.25±0.007	0.30±0.001	0.23±0.003	31.11±0.006
T3	0.37±0.001	0.47±0.002	0.33±0.010	36.97±0.006
T4	0.49±0.004	0.61±0.004	0.49±0.026	44.11±0.015
T5	0.77±0.015	0.65±0.003	0.60±0.006	52.12±0.006
Standard valuue organic fertilizer	1.00	0.50	0.50	50.00

Table 2: The quantities of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in the used materials in experiment

The used materials in experimenting	Total N (%)	P (%)	K (%)	OM (%)
Molasses	1.01±0.015	3.15±0.006	2.21±0.015	-
Organic waste from raw vegetables	0.65±0.025	0.65±0.025	0.77±0.006	23.36±0.015
Organic waste from raw vegetables mixed with molasses 1:15 kg mL^{-1}	0.79±0.006	0.81±0.025	0.88±0.015	23.36±0.006
Cow dung	1.96±0.015	0.82±0.032	1.16±0.038	58.73±0.030
Chicken dung	2.63±0.036	4.95±0.236	3.95±0.132	45.72±0.119
Pig dung	1.38±0.032	2.79±0.060	1.58±0.042	56.77±0.015
Mixed dung	1.90±0.087	2.80±0.040	2.13±0.023	53.75±0.012
Earth soil	0.02±0.010	0.18±0.015	0.14±0.006	0.56±0.006
Earth soil mixed with animals dung in the proportion of 10:1 kg kg^{-1}	0.18±0.021	0.28±0.006	0.20±0.026	7.76±0.108
Earth soil mixed with animals dung in the proportion of 10:3 kg kg^{-1}	0.27±0.025	0.41±0.047	0.30±0.015	13.67±0.093
Earth soil mixed with animals dung in the proportion of 10:5 kg kg^{-1}	0.38±0.006	0.59±0.015	0.43±0.021	20.67±0.091
Earth soil mixed with animals dung in the proportion of 10:7 kg kg^{-1}	0.63±0.029	0.63±0.017	0.59±0.030	28.79±0.321

decomposition was found that the dried earthworms dung fertilizer mixed with chemical fertilizer formula 46-0-0 and 12-12-12 was able to greatly grow broccoli in the way of height, amount wideness and length of its leaves and correspond to Nuanpudsa (2008) who studied the quickness and quality in earthworms dung fertilizer producing which comes from a various organic waste decomposition by the commercial earthworms breed and local breed was found that earthworms (*P. peguana*) dung mixed with dairy cattle dung is the most appropriated in producing an earthworms dung fertilizer because there is highly usable of calcium and magnesium. In case The earthworms (*Eudrilus eugeniae*) have the lowest quantitative value of organic materials conductance of nitrogen, phosphorus, calcium and magnesium which are beneficial for vegetation.

CONCLUSION

From the study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) was able to conclude that the quantity of mixed animals dung (chicken, pig and cow dung) which was mixed with earth soil that is for an earthworms habitat has an effect on quantities of nitrogen, phosphorus, potassium and organic materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*).

RECOMMENDATIONS

In the study on addition of nutrient pillar of Nitrogen, Phosphorus, Potassium (N:P:K) and organic Materials in organic fertilizer which is decomposed by using earthworms (*P. peguana*) there should be a usage of high quantity of earth soil that has a major nutrient pillar (N:P:K) to be a mixture in making earthworms habitat which caused more quantity of major nutrient pillar (N:P:K) and organic materials for the organic fertilizer which came from organic waste decomposition.

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