VERMICOMPOSTING MIXED WITH ADMIXTURES AND EARTH WORMS

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Abstract

The present paper aims at management of solid waste in regard to vermicomposting to help minimize the quantity up to the extent possible as it is also a cost effective technique. This process is mainly required to add nutrients to the soil. Vermicomposting is a process of composting that uses earth warm to convert organic waste into humus-like high-quality compost. This technique of converting organic waste into compost manure not only boosts organic production but also helps to effectively manage the household and urban organic waste. The study aimed to convert Yard waste like garden waste, news paper and cardboard, etc in to vermicompost by deploying earth worm and Admixtures like green grams, panchagavya and cow dung. The various parameters like Organic matter, COD, C: N ratio (below 20), pH value, carbon, nitrogen, Micro and Macro Nutrients, Were observed in analysis. Hence the only option is to recycle the garden waste. Recycling garden waste by composting/vermicomposting technique coverts the waste into manure to increase soil fertility as the cost of fertilizers showing exponential graph that is unbearable for local farmers. Vermicompost has several advantages over chemical fertilizers and is useful to crops. High lignin contents in garden waste makes the growth of earthworms and micro-organisms difficult in vermicomposting. Effective use of additives can encourage the growth of earthworms, accelerating the decomposition process. The results of the given study indicates that the additive aided vermicomposting process results degradation of organic matter, enrichment of nutrients and better quality of final vermicompost.

Keywords: *Earth Warms, Green Grams, Panjakavya, Cow Dung, Yard Waste, Organic Waste, Garden*

Introduction

Vermicompost is known to be World's best Fertilizer. Vermicomposting is a safe, hygienic and odourless way of processing organic garden waste, newspaper and cardboard. Composting is the transformation organic material (matter) through decomposition into a soil-like material called compost. Invertebrates (insects and earthworms), and microorganisms (bacteria and fungi) help in this transformation. Vermicomposting can be done either on-site or at a separate location, and the end products can be used for local benefit. The beneficial organisms and the liquid and solid fertilizers that are produced by vermicomposting improve soil conditions, and the health of the soil and plants.

Vermi-composting is the biotechnological method of composting by using different species of earthworms to boost waste conversion mechanism and achieve better product. Vermi-composting is a joint action of microorganisms and earthworms for degradation or breakdown of organic materials.

Through this procedure, the fundamental nutrients of plants like calcium, potassium, phosphorus, and nitrogen present in the mixture are changed into plant-available nutrients and soluble forms. Vermi composition is one of the recycling technologies which will improve the quality of products. The present study was undertaken to convert vegetable waste into value added vermin compost. In this paper discussed to provide high quality natural fertilizer low cost to the farmers. So that high yield varieties of crops can be achieved thereby improving the livelihood of farmers.

Materials and Methods

Green Gram

Green gram is one of the important pulse crops in India. It has been reported that Green gram has been cultivated in India since ancient times. It contains about 25 percent protein, which is almost three times that of cereals.

Table 1 Green Gram (Food Value & Minerals and Vitamins)

Food Value	Minerals and Vitamins
Moisture - 10.1%	Calcium - 75 mg
Protein - 24.5%	Phosphorus - 405 mg
Fat - 1.2%	Iron - 8.5mg
Fibre - 0.8%	Small amount of Vitamin B Complex
Minerals - 3.5%	* Values per 100 gm's edible portion
Carbohydrates - 59.9%	Calorific Value – 348

Figure 1 Green Gram Powder

Panchagavya an organic product has the potential to play the role of promoting growth and providing immunity in plant system. It consists of nine products viz. cow dung, cow urine, milk, curd, jaggery, ghee, banana, tender coconut, and water. When suitably mixed and used, these have various effects.

Figure 2 Panjakavya Preparation

Cow dung, cow ghee, cow urine, water, cow milk, cow curd, tender coconut water, jaggery and well ripened banana. Mix the cow dung and cow ghee thoroughly both in morning and evening hours and keep it for 3 days. After 3 days mix cow urine and water and keep it for 15 days with regular mixing both in morning and evening hours. After 15 days mix the remaining ingredients and panchagavya will be ready after 30 days.

Figure 3 Cow Dung

Worms

The worms used in vermicomposting are called red worms (Eisenia foetida). They are not the common earthworms. You can get them from friends, from a bait store or order them online. These worms are voracious eaters; but they will not survive our winters outdoors. They prefer a temperature range from 55-75 degrees.

Figure 4 Earth Worm

Vermicomposting

Collection of Yard Waste

Yard waste is did collected the **School** campus and nearby areas like apartment for use of composting purpose. Garden waste, wet waste and dry waste (70:50) this amount is very useful for

the carbon and nitrogen composition .this composition is helps to the decomposition of organic waste very fast. Amount waste collected 700 kg of wet waste and 500 kg dry waste.

Figure 5 Collection of Yard Waste (Garden Waste)

Feed the Bin

You will be feeding the bin (instead of feeding the worms) because although worms do eat some of the waste material put into the compost bin, they mostly feed on the microbes that break down the waste.

Figure 6 Feed the Bin (Organic waste and Garden Waste)

Panjakavya Analysis

Serial Dilution Technique

Serial dilution technique is initial steps to find the which kinds of organism present in panchakavya to take the panchakavya 1ml that 1ml of sample to divide into 9 serial. Then used the spread plate and pored the bottom of nutrient agar and potato dextrose agar after solidified then spread on the serial dilution sample (panchakavya).after incubate the 24-48 hrs and identify the microbial colonies.

Figure 7 Serial Dilution

Figure 8 Petri Dish – Microbial Colonies

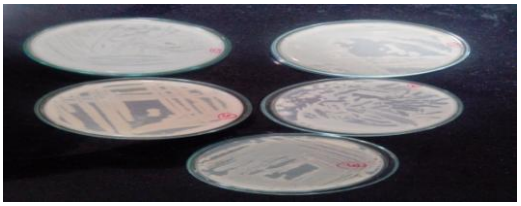

Figure 9 Sub Culture Test

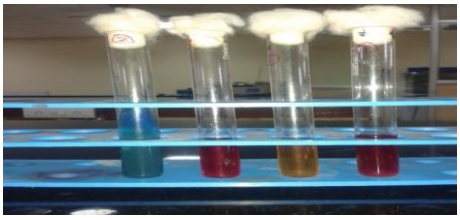

Figure 10 Bio Chemical Test

Results and Discussion

Collection of compost and vermicompost Samples for Physical and Chemical analysis.

Physical Parameters

Table 2 PH variations

S.No	Experimental Setup (Different Admixures)	Composting PH	Vermicomposting PH
1	Cow Dung	6.23	6.52
2	Green Grams	6.7	7.1
3	Panjakavya	5.45	6.3

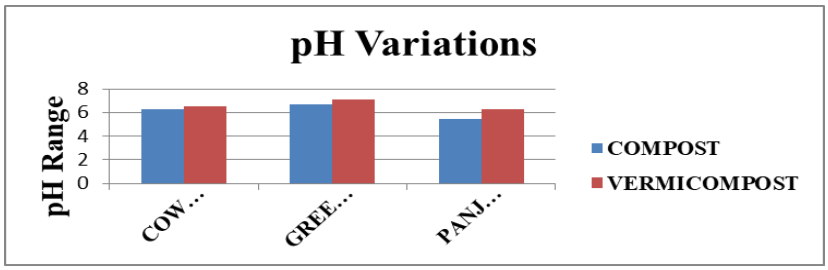

Figure 13 PH Variations

Electrical Conductivity (EC) ds/m

Table 3 Electrical Conductivity variations

S.No	Experimental Setup (Different Admixures)	Composting EC (ds/m)	Vermicomposting EC (ds/m)
1	Cow Dung	6.23	6.52
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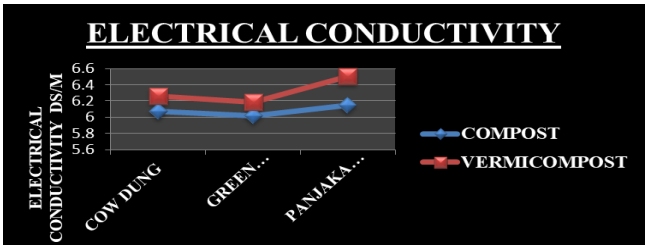

Figure 14 Electrical Conductivity Variations

Parameters

Cow dung Experiment chemical Parameters Results

Table 4 Cow Dung Experiments chemical parameters

S.No	Chemical Parameters	Composting (%)	Vermi Composting (%)
1.	Nitrogen (N) %	0.8	1.6
2.	Phosphorus (P) %	0.35	1.02
3.	Potassium (K) %	0.48	0.73
4.	C/N Ratio	8.47	5.51
5.	Calcium %	2.27	2.5
6.	Magnesium %	0.57	0.50

Panjakavya Experiment Chemical Parameters Results

Table 5 Panjakavya Experiments chemical parameters

S.No	Chemical Parameters	Composting	Vermi Composting
1.	Nitrogen (N) ppm	2.34	3.3
2.	Phosphorus (P) ppm	0.80	0.71
3.	Potassium (K) ppm	0.72	1.25
4.	C/N Ratio	9.57	6.3
5.	Calcium ppm	3.47	3.2
6.	Magnesium ppm	0.83	0.60

Green Grams Experiment Chemical Parameters Results

Table 6 Green grams Experiments Chemical Parameters

S.No	Chemical Parameters	Composting	Vermi Composting
1.	Nitrogen (N) %	2.42	3.5
2.	Phosphorus (P) %	0.88	0.71
3.	Potassium (K) %	0.68	1.2
4.	C/N Ratio	9.57	6.3
5.	Calcium %	2.9	3.5
6.	Magnesium %	1.5	2.8

Conclusion

It can be concluded that vermicomposting is a feasible technology for the conversion of garden waste, organic, yard waste after mixing with cow dung and green grams, panjakavya into a valuable product vermicomposting. Present study results it was found that the organic waste and garden waste mixed with green gram experiment is first composted after 10 days panjakavya admixtures experiment composed and the last composed experiment is cow dung admixtures experiment. It is 100% compost process. The quality of compost was found in the treatment of mixture of organic and yard waste with green grams treatment. After composting we have moved to vermicompost process. During the partial vermicompost we have collected the mixed waste and sent the feed to earth worms. That time the temperature is 0 degree Celsius. As per our present study, the best quality of vermicompost was found in the treatment of mixture of organic and yard waste using panjakavya admixtures experiment and the second quality of vermicompost was found in the treatment of wastes using green grams admixtures experiments. The last quality of vermicompost was found in the treatment of wastes using cow dung experiments. In the present study, growth parameters were significantly higher with the application of Panchagavya and vermicompost. From the above study it is very clear that the use of vermicompost and panchagavya have produced better results as compared to other groups.

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