Development of Composting Machine for Utilization of Kitchen Waste

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ABSTRACT

This project reviews the utilisation of kitchen waste for composting. Kitchen wasteis one of the most prominent waste streams across the whole world, and in India 50% of total waste is kitchen waste. Open dumping and land filling causes environmental degradation and harmful diseases, thereby releasing toxics in the atmosphere which causes pollution. Methane produced from kitchen waste constitutes one of the six green house gases responsible for the global warming. This problem is taken into consideration for project work. In this project we are developing a mechanized system to produce manure (i.e.Compost). This project seeks to minimize environmental impact and maximize economic benefit at acceptable cost. This will lead to improve soil structure and fertility. Composting is an important way that we can giveback to the local community and our natural world. In this project we tested 4 samples these were soil, compost, soil & enzymes, Compost & Enzymes and came to know that Compost has superior attributes as compare to others.

Keyword:*Compost, Dumping, Soil fertility, Green house gases.*

1. INTRODUCTION

Kitchen waste is defined as left-over organic matter from restaurants, hotels and households. Tons of kitchen wastes are produced daily in highly populated areas. Kitchen wastes entering the mixed-municipal waste system are difficult to process by standard means, such as incineration, due to the high moisture content. Furthermore, organic matter can be transformed into useful fertilizer and biofuel. New disposal methods that are both environmentally and economically efficient are being developed which rely on various forms of microbial decomposition.

In the present scenario, managing the tons of municipal waste we generate is a challenge that municipal bodies are trying to crack. The figure given below shows that how waste is treated.

Fig.1.1.1. WASTE TREATMENT

Often, the waste is burnt in the open, and toxic pollutants from the fires have known to can cause respiratory problems, cardiovascular diseases and adverse birth defects. In addition transporting, handling, and disposing such a huge amount of waste results in the emission of greenhouse gases, fumes of sulphur dioxide and oxides of nitrogen (also called acid gases), particulate matter, and other toxic substances.

This project focuses on making a machine for converting the organic waste into compost. This will in turn reduce landfill space, reduce surface and groundwater contamination, reduce methane emissions, reduce transportation costs , reduce air pollution from burning waste, provide more flexible overall waste management, enhance recycling of materials and can be carried out with little capital and operating costs.(Home Composting).

1.2 TRADITIONAL METHOD

A layer of compost materials consist of three parts rice straw, one part of manure, soil and ash lime spread on top of each other. Water each layer of compost heap until it is sufficiently moist. Cover with plastic sheet, used sacks, banana and coconut leaves to increase temperature and prevent too much water into compost heap which could leach the nutrients. 3 to 4 months before the farm waste are fully decomposed and ready to use as a compost fertilizer.

Fig.1.2.1 PIT

Fig.1.2.2. Cover Pit by Kitchen Waste & Soil

Fig.1.2.3. Cover the Pit by Plastic

2. PROBLEM STATEMENT

- There are many ways in which we can do our bit to help reduce our carbon footprint and combat climate change. Perhaps the simplest of these, however, is by composting biowaste. This easy step can greatly increase the amount of carbon contained in soil, and also impacts on our waste management.
- Food waste is a growing area of concern with many costs to our community in terms of waste collection, disposal and greenhouse gases. Kitchen waste is an untapped energy and contains nutrients that are rotting in landfills, thereby releases toxics in the atmosphere which causes pollution. Landfills of kitchen waste

produce unaesthetic surroundings, thereby causing health hazards. Food waste costs you money and also wastes the valuable water and energy resources used to produce the food.

- With these problems, our aim is to create a proper kitchen waste management system which in turn will contribute to Swachh Bharat Mission.

Fig.2.1. Reuse and Recycle

3. FABRICATION WORK

Fig 3.1

Different components and its specifications are given in the table which is utilized for the complete fabrication of the machine.

Following table shows different components used to fabricate the machine.

Sr. No.	Components	Specifications
1	Shaft-1	12 mm
2	Shaft-2	18 mm
3	Bearings	Φ 12*21*5
4	Larger Pulley	Φ 315 mm
5	Smaller Pulley	Φ 80 mm
6	AC Motor	Power (0.75 hp) RPM (1440 rpm)

Table 3.1 "Components and specifications"

4. COMPARATIVE STUDY BETWEEN MANUAL AND MECHANIZED MACHINE

The production rate of compost by traditional method requires 3-4 months and it also consumes manual efforts like making pit, then covering it again by soil and plastic which may also require labour cost.

These problems can be reduced with ease by making use of the machine which not only reduces the time but also reduces manual efforts. The machine increases the production rate of compost.

Contents	Standard Values	Soil	Compost	Soil + Enzymes	Compost + Enzymes
pH	7-8.50	7.45	7.60	7.65	7.50
Carbon content (%)	0.41-0.60	0.31	0.49	0.62	0.42
Nitrogen (kg/hect.)	280-420	163.2	188.6	207.6	179
Phosphorous (kg/hect.)	31-50	28.60	28.60	26.20	27.50
Potassium (kg/hect.)	181-240	344.7	425.5	410.5	388.5

Table 4.1 "Comparisons of all sample values with standard values"

5 COMPARING DIFFERENT SAMPLES

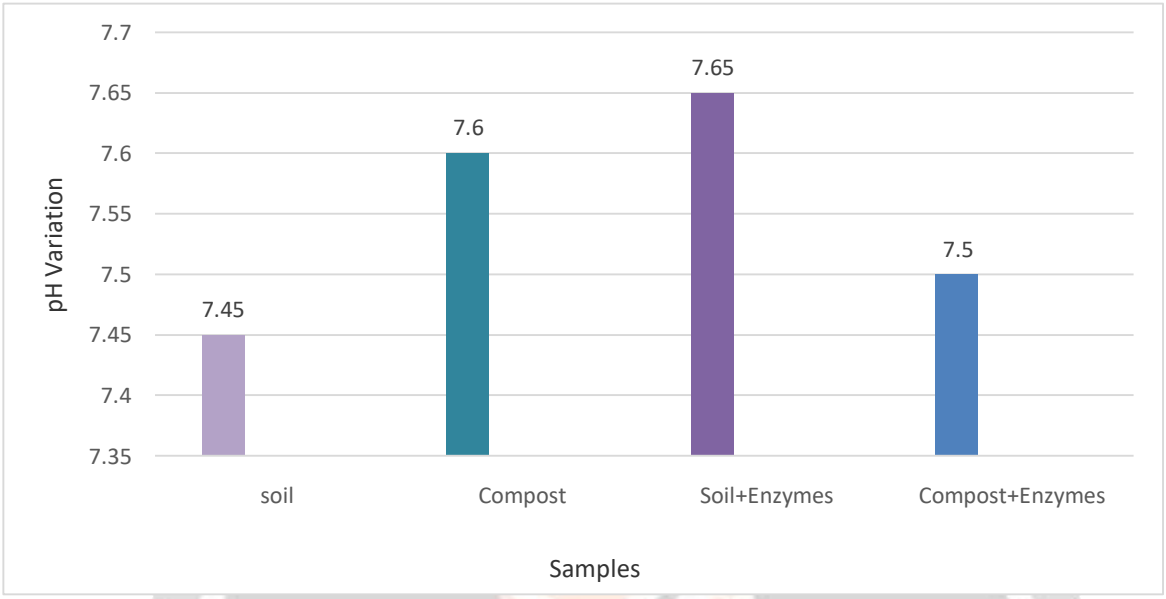

Fig. 5.1 pH Variations

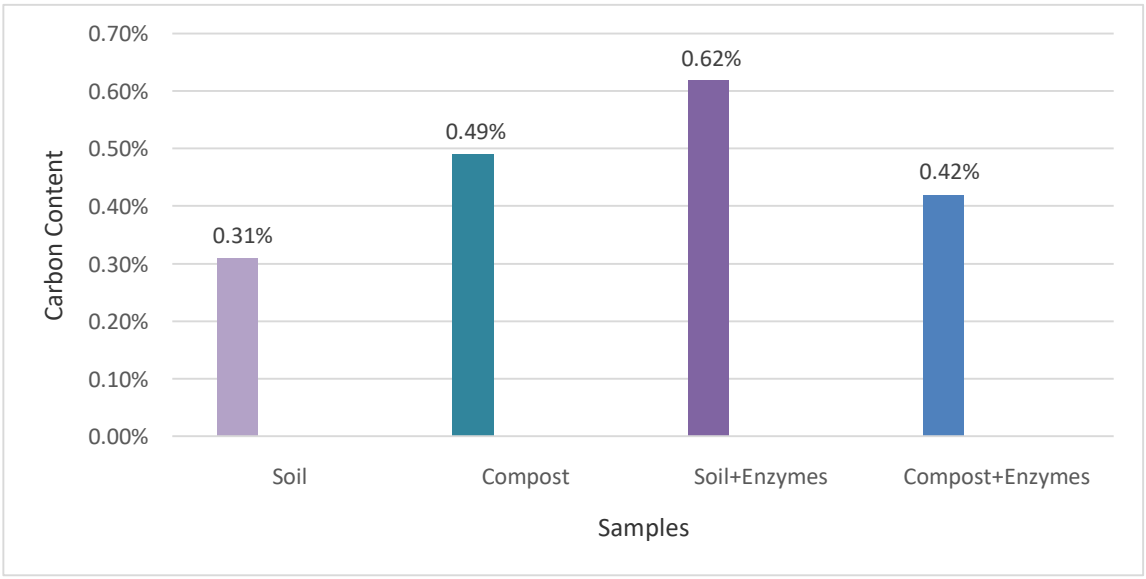

Fig. 5.2 Carbon Content Variations

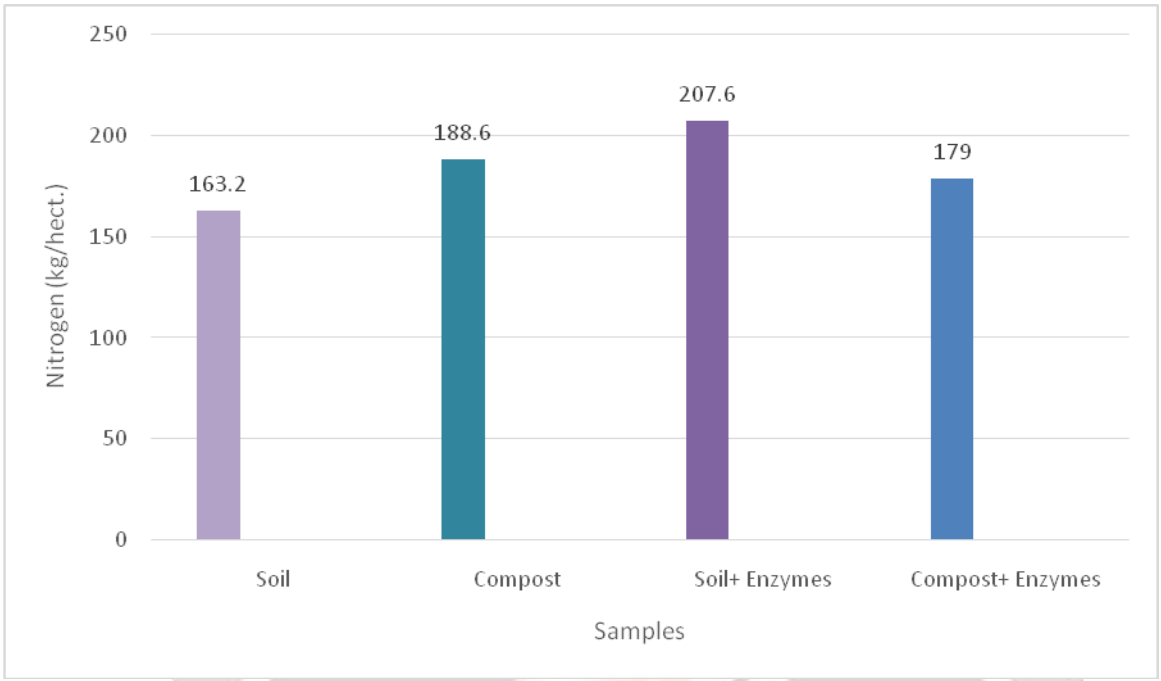

Fig.5.3 Nitrogen Variations

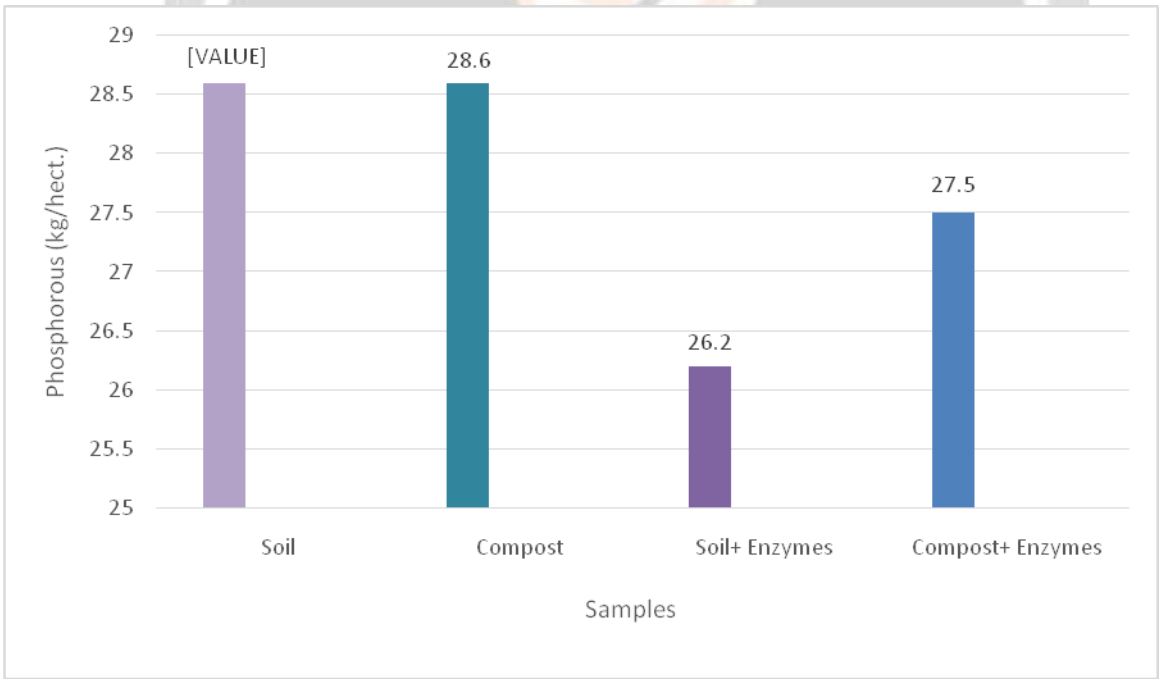

Fig. 5.4 Phosphorous Variations

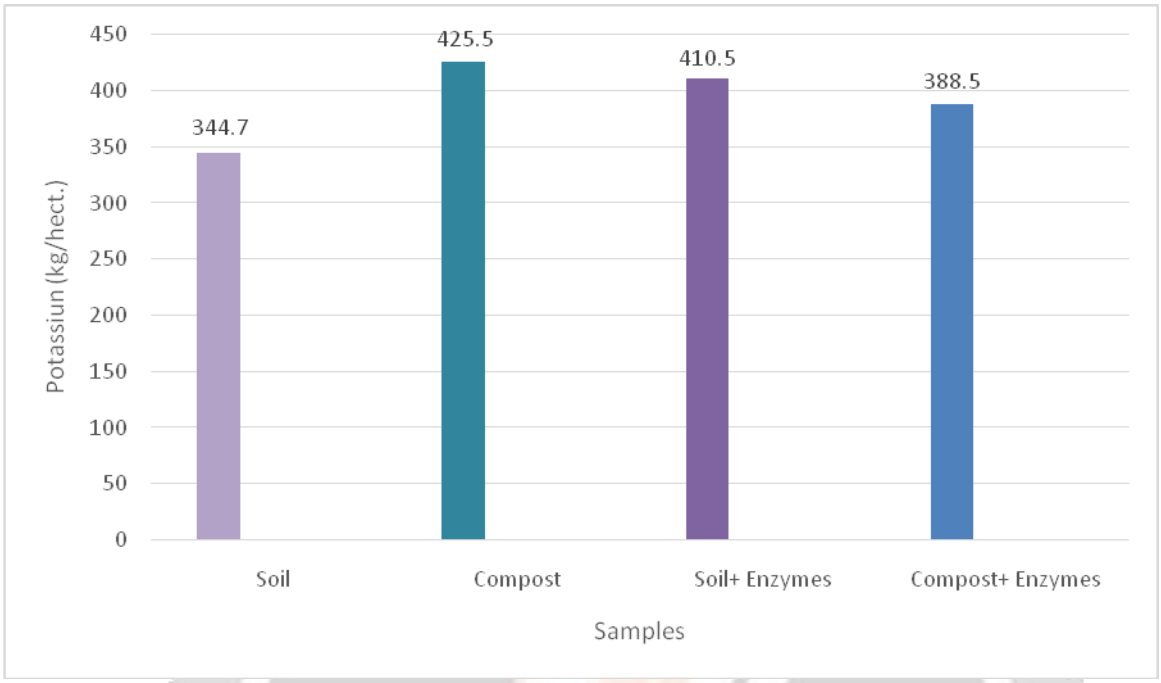

Fig.5.5 Potassium Variations

6. CONCLUSIONS

In the beginning of this project, we set our objective and goals to come up with a solution for kitchen waste disposal problem, those objectives were that the solution should be eco-friendly and it should decreased the garbage volume and the disposal cost. Those objectives were all met by choosing composting to cope up with kitchen waste disposal problems.

The carbon content which is most vital property for a healthy soil is not more than 0.40%. The developed technique by which compost is produced contains more than 0.40% carbon content which enhances the quality of the soil. Using this system, one can save manpower and water to improve production and ultimately increase profit. Increasing public awareness on kitchen waste is of utmost importance to tackle the problem of a climate change.

7. REFERENCES

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