Generating Organic Manure (Compost tea) by Vegetable Waste

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***Abstract*–There is an urgent need to standardize compost tea production method using kitchen waste from CARE Group of Institutions hostel and application rates as far as possible to increase their effectiveness, avoid adverse effects and decrease human and environmental potential hazards. Most of the evidence on their effectiveness in plant growth enhancement or disease suppression is anecdotal. There have been few well-designed experimental trials or scientific reports that assess their effectiveness or focus on finding optimal production methods or application rates. There are also very few reports on possible mechanisms by which they promote plant growth or suppress plant diseases. Intensive use of chemical fertilizer in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and on environment health Concerns regarding soil degradation and agricultural sustainability have kindle interest in assessment of soil quality. Soil quality refers to capacity of soil to accept, store and recycle nutrients and water so that economic yields or obtain without deterioration of environmental quality.**

I. INTRODUCTION

Until recently compost tea has been defined simply as a **liquid extract from composted material** that may contain organic and inorganic soluble nutrients, and a large number of organisms including bacteria, fungi, protozoa and nematodes (ROU, 2003b).

Intensive use of chemical fertilizer in agriculture increases the crop production but at the same time it causes negative impact on land, air, water and on environment health Concerns regarding soil degradation and agricultural sustainability have kindle interest in assessment of soil quality. Most of the evidence on their effectiveness in plant growth enhancement or disease suppression is anecdotal. Human beings mainly such as **Children's and foetuses are most vulnerable** to pesticide exposure because their immune systems, bodies, and brains are still developing. Exposure at an early age may cause developmental delays, behavioural disorders, autism, immune system harm, and motor dysfunction so that organic food is important need in day to day life.

Massive Vegetable wastes from the markets and kitchens will create an unpleasant odour and spoiling the soil characteristics. The market wastes are collected through the municipality and then it is simply dumped into the landfills and its leaching highly affect the environment. The following images shows that the vegetable wastes and their effects.

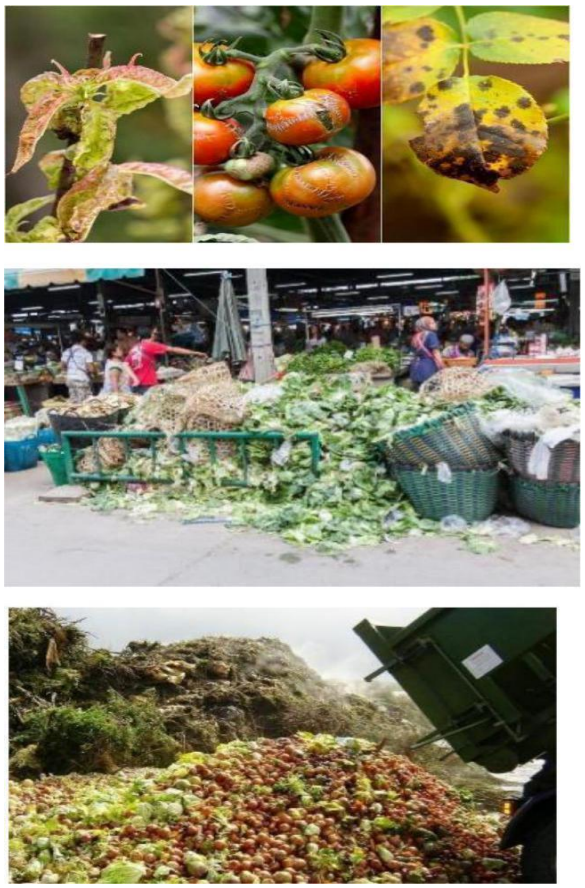

Figure 1 Vegetable Wastes and their effects

Compost leachate is the dark coloured solution that leaches out of the bottom of the compost pile (compost windrow leachate). This leachate is most likely rich in soluble nutrients, but in the early stages of composting it may contain pathogens (Diver, 2002). Compost leachate needs further bioremediation and is not suitable as a foliar spray.

Compost extract is a centuries old technique in which compost is suspended in a barrel of water for 7 to 14 days, usually soaking in a sack (Diver, 2002). The primary benefit of the extract is to provide a supply of soluble nutrients that can be used as a liquid fertiliser.

Compost tea is made by two different methods:

- Non-aerated method; and
- Aerated method.

In the non-aerated method {which produces non-aerated compost tea (**NCT**)} there is no attempt to supply the organisms with supplementary oxygen (Scheuerell, 2003), resulting in, for the most part, anaerobic conditions during tea production, which limits growth of microorganisms (Kelley, 2004). In the aerated method {which produces aerated compost tea (**ACT**)}, the mixture is deliberately aerated (Scheuerell, 2003; Kelley, 2004; Ingham, 2005), allowing large numbers of beneficial organisms to populate the mixture (Ingham, 2005).

For both methods of compost tea production, microbial food may or may not be added. If additional food is not added, organisms are not typically active and, are less likely to survive the transfer from mixture to soil, or applications to plant surfaces (Ingham, 2005).

Aerated compost tea (ACT) can be prepared in 2 to 3 days which enables growers to respond quickly to weather forecasts or indications of disease outbreak (Kelley, 2004). Aerated compost tea production also creates fewer odours and reduces the risk of contamination by human pathogens.

Non-aerated compost tea (NCT) preparation takes up to 2 weeks, however longer fermentation time enables accumulation of antibiotics in the NCT which are claimed to activate natural plant defence responses thereby help in disease suppression (Scheuerell, 2003). Non-aerated compost tea may develop odours.

II. METHODOLOGY & WORKING PROCESS

A. TYPES OF ORGANIC MANURE

Farm Yard Manure

These are commonly used organic manure that is readily available and includes cattle dung as well as excreta of other animals. It is an important agricultural by-product. Its major advantages are: 1.ability to improve the soil, tilth and aeration. 2. increases the water holding capacity of soil. 3. stimulate activity of micro-organism.

Green Manuring

Green manure refers to fresh matter added to the soil largely for supplying the nutrient contained in the bio mass. Leguminous plants are largely used as green manure due to their symbiotic N fixing capacity. Some non-leguminous plants are also used due to their local availability, drought tolerance, quick growth and adoption to adverse conditions. Any plant cannot be used as a green manure and practical farming.

B.MATERIALS USED

- Vegetable Waste
- Saw Dust
- Filter Bag
- Aerator

WORKING:
Initially a small quantity of vegetable waste can be collected. The vegetable waste and the Saw dust are sandwiched between the soil upon three to four layers. TheCompost are turned over on different days such as 10th day, 20th day & 30 [10] day. After composting process, the organic manure was taken into the tea bag and dipped into the water and it can be allowed for the 24 hours aeration (1kg of organic manure (compost) in 3 litres of water). The compost tea sample is taken after aeration process for testing the parameters such as pH, Na, K, Ca, BOD on different days mentioned above. This compost tea is easily integrated into existing plant fertility and disease control programs due to its ease of application via existing irrigation or spray equipment, or as a soil drench.

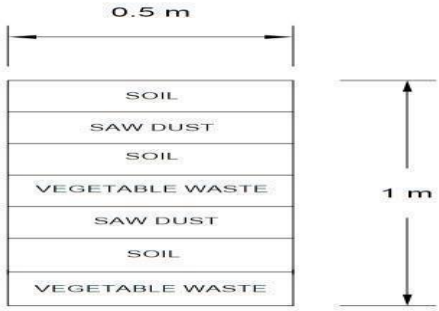

Figure 2 compost setup

Table 1 Table of Instruments Used to Determine the Soil Characteristics

S. No.	Parameter	Instrument Used
1	pH	pH strips
2	Odour	Physiological sense
3	Colour	Visual
4	B.O.D	B.O.D Incubator
5	Sodium	Flame photometer
6	Potassium	Flame photometer
7	Calcium	Flame photometer

Figure 3 photograph of Field Compost setup

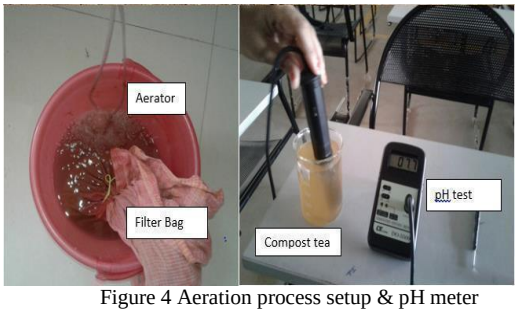

Figure 4 Aeration process setup & pH meter

III. RESULTS & DISCUSSIONS

Table 2 Analysed Compost Tea Parameters Without Aeration

S. No.	Parameters	Compost tea parameter values with different days			
		0th day	10th day	20th day	30th day
1	Colour	Light brown	Light brown	Brown	Dark Brown
2	pH	9.8	9.8	9.7	9.6
3	Na	28 ppm	32 ppm	56 ppm	84 ppm
4	K	33 ppm	40ppm	58 ppm	116 ppm
5	Ca	26 ppm	28 ppm	47 ppm	51 ppm
6	BOD	110 ppm	110 ppm	115 ppm	125 ppm

This table shows that the compost tea parameters in different days in the absence of aeration.

Table 3 Analysed Compost Tea Parameters With Aeration

S. No.	Parameters	Compost tea parameter values with different days			
		0th day	10th day	20th day	30th day
1	Colour	Light Brown	Light Brown	Brown	Dark Brown
2	pH	9.6	9.6	9.6	9.2
3	Na	48ppm	54 ppm	69 ppm	114 ppm
4	K	28 ppm	46 ppm	72 ppm	164 ppm
5	Ca	30 ppm	42 ppm	48 ppm	56 ppm
6	BOD	120ppm	135 ppm	140 ppm	140 ppm

This table shows that the compost tea parameters in different days in the presence of aeration. To increase the chlorine content, compost tea is exposed to aeration.

EFFECT OF SODIUM CONTENT IN COMPOST TEA WITH VARIOUS DAYS:

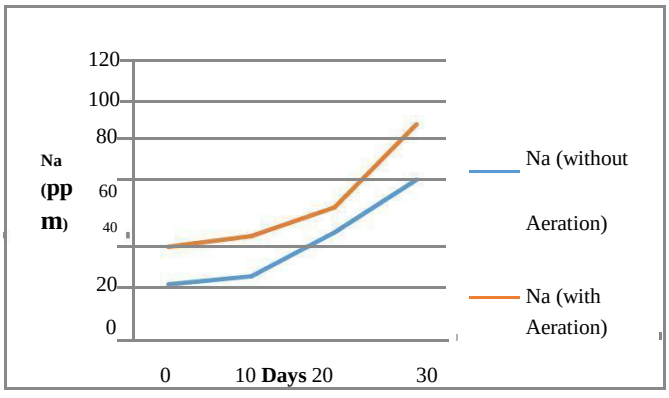

Figure 5 Effect of sodium

From the fig. 5 shows that the effect of sodium content in the compost tea is increasing day by day. Obtained 66% of sodium with the without aeration process and 57% of sodium increased with an aeration process and it will also increase the crop productivity and yield.

EFFECT OF POTASSIUM CONTENT IN COMPOST TEA WITH VARIOUS DAYS

From the fig.6 shows that the effect of potassium content

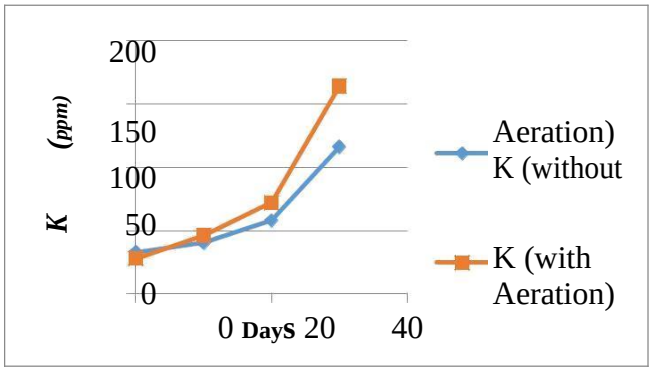

Figure 6 Effect of potassium

in the compost tea is increasing day by day. Obtained 71% of potassium with the without aeration process and 83% of potassium increased with an aeration process and it will also increase the crop productivity and yield.

EFFECT OF CALCIUM CONTENT IN COMPOST TEA WITH VARIOUS DAYS

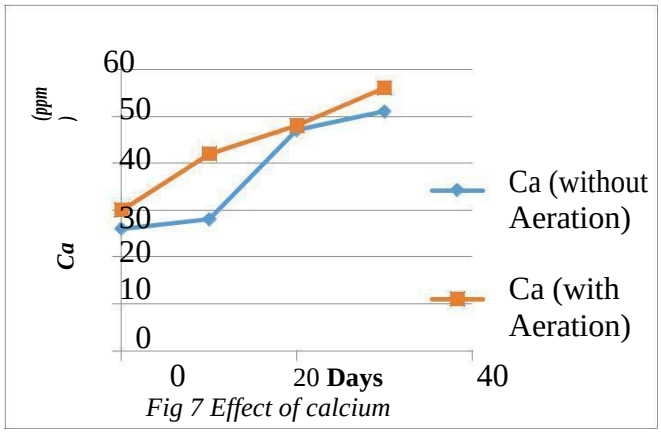

Fig 7 Effect of calcium

From the fig. 7 shows that the effect of calcium content in the compost tea is increasing day by day. Obtained 49% of calcium with the without aeration process and 46% of calcium increased with an aeration process and it will also increase the crop productivity and yield.

EFFECT OF BOD IN COMPOST TEA WITH DIFFERENT DAYS

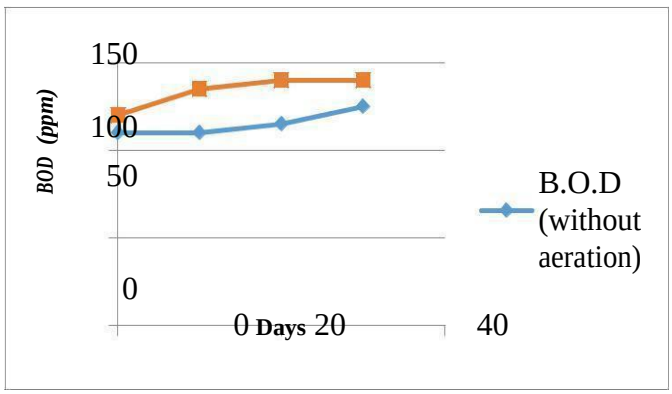

Figure 8 Effect of BOD

From the fig.8 shows that the effect of Biological Oxygen Demand content in the compost tea is increasing day by day. Obtained 12% of BOD with the without aeration process and 14% of BOD increased with an aeration process and it will also increase the crop productivity and yield.

COMPARISON WITH ARIYAMANGALAM DUMP YARD PARAMETERS

Table 4 Ariyamangalam dump yard Compost Tea Parameters With Aeration

S.No.	Parameters	Ariyamangalam Dump Yard Parameters
1	Colour	Dark Brown
2	pH	10
3	Na	0.5ppm
4	K	0.9 ppm
5	Ca	0.7 ppm
6	BOD	90 ppm

Ariyamangalam is situated along the national highway of Trichy to Tanjore. In earlier it is outer area of corporation of Tiruchirappalli due to the urbanization and expansion of the city now it is placed in centre of Trichy. It is 10 km in the east direction from Trichy. It has an area of 48 Hectares. An average of 20 trucks used to collect the solid waste in and around Trichy Corporation and dumped at Ariyamangalam composting yard. There is no proper segregation and disposal of municipal solid waste. Now one manure form unit at Ariyamangalam, to segregate biodegradable wastes and decompose it to form manure bed solid waste generation rate is more it has been dumped at nearly 20feet height from ground level. The generated municipality solid waste includes residential, commercial, industrial, institution and hospital wastes. Major part of the solid waste dumped at the site (nearly 60%) consists of organic waste like kitchen waste from residences, marriage halls, hotels, vegetables, fruits and flowers. Others include recyclable like plastic, wood, paper, hospital waste like syringes, tissues, soiled cotton and toxic waste like pesticides, chemicals, bulb, spray cans etc. toxic waste constitutes nearly 20% of the total dumped waste.

IV. CONCLUSION

We obtained the results from the compost tea parameters without aeration are pH -9.6, Na-66%, ca-49%, K-71%, BOD-12% and obtained the results from the compost tea parameters with aerations pH -9.2 , Na-57 , ca-46% , K-83%
, BOD-14% respectively. The nutrients level increased with increasing the composting day. These parameters will help the improvement of crop productivity and as well as soil fertility.

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