

VERMICOMPOSTING OF VEGETABLE MARKET WASTE USING EUDRILUS EUGENIAE EARTHWORMS AT VADODARA CITY

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Abstract - Due to rapid urbanization and uncontrolled growth of population food need get increased, vegetable market wastes management (VMWM) has become acute in India. VMWM, through an essential service, is given low priority. Lack of financial resources, institutional weakness improper choice of technology and public apathy toward has made this service far from satisfaction. The current practices of the uncontrolled dumping of vegetable market wastes with other municipal solid wastes on outskirts of town/ cities have created a serious environmental and public health problem estimation on the quantity and characteristics of consolidate municipal solid waste and its separation with municipal solid waste & separate vermicomposting of vegetable market waste forecasting over the planning period is the key to successful management plan. The earth worms like *EUDRILUS EUGENIAE* have been fortunate to degrade wastes and turn them to fertilizer which is popularly termed as vermicomposting, thus acquired product is recognized as vermicomposting. It is the resourceful technique to renovate the vegetable market waste (biological waste/organic waste) into a biological fertilizer. It is Vermicomposting is a simple biotechnological process in which

earthworms are employed to convert the organic waste material into vermicomposting or excellent organic compost

Key Words: Vegetable, human health hazards, vermicomposting, fertilize, environmental benefits .etc

1. INTRODUCTION

Increased demand of agricultural products boosted tremendous pressure for more production of grains & vegetables by adopting modern agricultural practices. Modern agricultural practices contribute much deleterious effect on the field soil. Organic matters are not fully recycled, which affect the nutrient regenerative capacity of soil and ultimately to crop production. Use of high chemical fertilizers for more production of crops & vegetables is one of the major caused of destruction of soil flora fauna, responsible for their natural quality. Vegetable Waste is the largest component of the discarded waste. Afterwards comes corrugated boxes and food waste includes left over portions of meals and trimmings from food preparation activities in kitchens, restaurants and fast food chains current survey, the Vadodara, city, 70,806 (as per census 2011) produces about 750 MT of municipal solid waste per day i.e. 0.45 kg

/c/day. Out of which 50% bio degradable organic matter, 10.25% recyclable sold waste, 8% inert solid waste, 12% unclassified foil debris and 20% moisture content. Out of which only 250 TPD get segregated and bio degradable waste composted in compost plat and reject is transported to landfill sites. Another 400 MT directly goes to sanitary landfill sites developed by Vadodara Municipal Corporation as per MoEF Municipal solid waste (Management & handling) Rule 2000. Many private companies are involved in processing of Mechanical Aerobic Windrow Composting Method to reduce load of land fill sites & increase life span, but due to lake of willing ness & improper technology adopted and unforeseen reasons they can't get required success & run the plants economically.

2. The main objectives of this study are:

1. To judge the suitability of species *Eudrilus Eugeniae* earth worm to the Vegetable Market waste.
2. To judge the suitability of vermicomposting technology or safe disposal of organic waste.
3. To know about the rate of vermicomposting.
4. To assess the quality of compost obtained from Vegetable waste.
5. To optimize the operating parameters for vermicomposting of Vegetable

TABLE 1.COMPOSITION IN MUNICIPAL SOLID

Sr.	Type of Waste	Percentage by Waste
1	Vegetable Leaves	40.
2	Grass	3.8
3	Paper	0.8
4	Plastic	0.6
5	Glass/Ceramic	0.4
6	Metal	0.6
7	Stone/ashes	41.
8	Miscellaneous	11.

TABLE -2 LIST OF VEGETABLE MARKEST IN VAODDARA CITY

Sr. No.	Name of Market
1	Khanderao Vegetable Market
2	Chhani Vegetable Market
3	Karadiya Vegetable Market
4	Raopura Vegetable Market
5	Sayajiganj Vegetable Market
6	Laxmipura Vegetable Market
7	Indraprastha Vegetable Market
8	Sama Vegetable Market
9	Gorwa Vegetable Market
10	Nagarwada Vegetable Market
11	Tarsali Vegetable Market
12	Sayajipura Apmc Vegetable Market
13	Hathikhana Vegetable Market

3. COMPOSITE SAMPLE

To collect the vegetable wastefirstofallpick10%ofmarket waste in the division so the sample shall be correct .In collecting sample the eremustinclude all the type of constructions like big A.P.M.C. (Agro

Process Market Committee markets where Vegetable sold by farmers to multi commodity bulk dealers) bulk vegetable Markets where 100 to 120 MT vegetables handled every day & bulk deals done , Medium Markets where 30 to 50 MT vegetables handled every day (Central Markets in Cities where Vegetable sold & purchased between big dealers & small vendors) and Small Markets where 8 to 10 MT vegetables sold by small vendors to end users (Multi location scattered small markets) . The samples are collected separately i.e., wet vegetable waste (green leafs of vegetables & unused portion of vegetables like roots etc.)&dry vegetable waste (partly decomposed or one or two days older vegetables etc.).This sampling process is continued for seven days so that we can predict the average value.

4. PARAMETERS SELECTED FOR SOLID WASTE ANALYSIS

1. Organics matter, COD, TOC
2. Total Nitrogen
3. Ca, Mg, Na, K
4. C/N Ratio
5. PH

5. INSTRUMENTS USED

1. Digital pH Meter
2. Spectrophotometer
3. Moisture Balance
4. Flame Photometer
5. Cooling Incubator
6. Muffle Furnace

7. COD Analyzer

5. METHODOLOGY:

The vermiculture eco system involve harnessing the activities of beneficial soil bacterial and process vegetable waste by suitably combining vegetable waste with necessary additives. Here soil bacteria serve as the processing workforce, earthworms regulate the bacterial activity and process rock particles to supply inorganic nutrients. This methodology can be used for quantitative design and monitoring criteria for

1. Organic processing,
2. Health care for soil and
3. Health care for water bodies.

6. START-UPOF VERMICULTURE REACTOR:

BATCH -1Worm :Soil: Vegetable waste
:: 1 : 05 : 05

BATCH-2Worm :Soil:Vegetable waste
:: 1 : 05 : 10

BATCH-3Worm :Soil:Vegetable waste
: : 1 : 10 : 10

BATCH-4Worm :Soil:Vegetable waste
: : 1 : 10 : 15

7. RESULTS:

- 1) Earthworm species *Eudrilus engeniae* capable to convert 50 percent organic matter of Vegetable waste into vermicompost (
- 2) COD and TOC of Vegetable waste reduced by 64 percent and 75.5 percent respectively of its initial value in 45 Days period.
- 3) The initial acidic pH get buffered to neutral due to Vermicomposts.
- 4) There is increasing nitrogen content.
- 5) C/N ratio 715.71 drastically reduced to 54.44 in 45 Days period.
- 6) Bio-mass weight doubles up in 45 Days period,
- 7) Weight of Vegetable waste reduced to 53.79 percent of initial weight

8. SUGGESTION TO V.M.C. FOR ORGANIC SOLID WASTE MANAGEMENT:

In Present scenario, Total quantity of M.S.W. generation is 750 MT per Day in Vadodara city, out of which 730 MT per Day is collected, processed & landfilled. Solid Waste is processed by Mechanical Aerobic Windrow Composting Method. Current Composting Plant capacity is 250 TPD & Landfill site Capacity is 700 TPD. No Economy is found due to no required quantity of Organic Solid Waste get to successful run the plant because there is no facility of Separation of Solid Waste into Organic & Inorganic. Lot of time and energy is wasted in segregation at plant site.

- 1) It is suggested to V.M.C. that segregation of Organic Solid Waste & Inorganic Solid waste to be done at Collection point itself.
- 2) Door to Door Collection vehicles are redesigned to collect Solid & Liquid Waste from domestic household waste collection.
- 3) Training to be given to Door to Door

collection staff for separation of Organic Solid Waste & Inorganic Solid waste.

- 4) At vegetable market's waste generated in 99% Organic Biodegradable Waste, but it is mixed with other solid wastes, it should be changed and such Vegetable Market Waste will be directly send to composting plant.
- 5) Separate Vermicomposting plant need to be set up for treating such high organic rich waste.
- 6) Food Industry Waste & Kitchen Waste also need to be processed in Vermicomposting plant.
- 7) Awareness to be created among people for benefits of Waste separation.

9. FURTHER SCOPE FOR

Vegetable waste vermicomposting to be done with new specific species of earthworms *Perionyx ceylanensis*, *Perionyx excavatus*, *Perionyx hawayana*, *Lumbricus rubellus*, *D. veneta*, *Lampito Mauritii* with different animal dung & agro waste combination to be study & diff. C/N & C/P Ratio and NPK percentage to be calculated and its effect on plant growth to be study.

1. Household small units of small scale anaerobic bio gas digester & Vermicomposting of Biogas Sludge (organic slurry) to be developed to reduce transportation cost & GHG Emission.
2. Future study on the vermiwash produced from different wastes products singly and their binary combinations on the plant growth & crop yield.

3. Potential of Indigenous species in Vermicomposting & agriculture needs to be explored.
4. By seeing the difficulty to collect separated organic waste on a large scale, Institutional units need to be installed for both Bio Gas generation & Vermicomposting and amendment in the law need to be done

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