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VERMICOMPOSTING OF VEGETABLE MARKET WASTE USING EISENIA FETIDA EARTHWORMS AT VADODARA CITY

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Abstract—With increasing population, food requirement get increased, it get much increase of vegetable sale & it required huge supply chain of vegetables from farmer's field to our home .Vegetable markets plays a key role where vegetables will buy and sale in any city. Due to improper setup for storage and ancient supply methods recognizable quantity of vegetable waste generated .Vegetable leafs & partial composted vegetables are mainly throne out as vegetable waste. As it contain rich organic value, flees generated and also animals like cow, got, dog crowded to eat this vegetable waste. Vegetable wastes from vegetable market are source of environmental pollution, global climatic changes and human health hazards. As of now most places vegetable wastes are disposed combindly with municipal solid waste. These methods of disposal and management are not satisfactory. These vegetable wastes potentially nutritious residues are soft, succulent and easily decomposable and instead of disposing or damping, it can be used as source of organic residues for utilizing the embedded nutrients through compost production. Efficient collection and Disposal of vegetable market waste is big problem. The cost of collection, transportation shortening, treatment and safe disposal are escalating. Considering this there is a need to consider vegetable wastes as resource as raw material for generation of vermicomposting bio fertilizer. This project attempts to put together available information and analyze the problem of vegetable market wastes. Proper management of vegetable market wastes can play an important role in generation of social, economic and environmental benefits

Keywords— Vegetable, human health hazards, vermicomposting, fertilize, environmental benefits .etc

I. INTRODUCTION

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 *Eudriluseugeniae&Eiseniafetida* 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

FIG. 1: VADODARA CITY

II. The Objectives of the present studies are summarized as follows

1. To judge the suitability of EiseniaFetida species of earthworm to treat 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 waste

III. ADVANTAGE OF VERMICOMPOSTING

1. Vermicomposting appears to be generally superior to conventionally produced compost in a number of important ways.
2. Worm shave number of other possible uses on farms, including value as a high quality animal feed as well as there are Therapeutic uses of Earthworms.
3. Vermicomposting and vermi-culture offer potential to organic farmer as sources of supplemental income.
4. From vegetable waste, lower emissions of CO2 and other gases than from conventional fossil-fuel

generation

Table1.Comparison between per capita MSW generation in low, middle and high income countries.

Country	Per Capita Urban MSW Generation (kg/day)	
	1999	2025
Low income countries	0.45-0.9	0.6-1.0
Middle income countries	0.52-1.1	0.8-1.5
High income countries	1.1-5.07	1.1-4.5

Table 2 per Capita Waste Generation Rate

Original Classification	Classification forthis Study	Population Range(2001 Census)		No. of Cities	Per Capita kg/day
Class 1	Metropolitan	5,000,000	Above	6	0.605
	Class A	1000,000	4,999,999	32	0.448
	Class B	700,000	999,999	20	0.464
	Class C	500,000	699,999	19	0.487
	Class D	400,000	499,999	19	0.448
	Class E	300,000	399,999	31	0.436
	Class F	200,000	299,999	58	0.427
	Class G	150,000	199,999	59	0.459
	Class H	100,000	149,999	111	0.445
Class 2		50,000	99,999	6	0.518
Class 3		20,000	49,999	4	0.434
Class 4		10,000	19,999	1	0.342
	TOTAL			366	

V. EARTHWORM

4.1 EiseniaFetida

Eiseniafetida,popularlyknownasredwriggler,redworm,tigerwormetcisperhapsthemostwidelyusedearthwormforvermicomposting.Thespecieshasalsobeeninwideusagesforvarioustoxicologicalstudiesastesteworm.Matureindividualscanattainupto1500mgbodyweight.Eachmaturewormonanaverageproducesonecocooneverythird day and from each cocoon on hatching within 23 day emerge from 1 to3individuals.Requiremoderatetemperaturesfrom135°C.Whiletolerancesandpreferences varyfromspeciestospecies.Earthwormscantoleratecoldandmoistconditionsfarbetter than hot and dryconditions.ForEiseniafetidatemperaturesabove10°C(minimum)and15°Cbemaintainedformaximizingvermicompostingefficiencyandabove15°(minimum)andpreferably20°Cforvermiculture.Highertemperatures(35°C)maymortality.

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FIG. 2. EISENIA FETIDA

V. LIFE CYCLE OF EARTHWORMS

Vermicasting can be store in the bags, protected from the sun, for a period up to one year, However most farmer apply Vermicasting to the soil within amonthto'grow' this bio fertilizer by feeding with cow manure and crop residues. Vermicasting have an immediate effect on the crop due to the stock of balanced plant nutrient sin read available form. Vermicastingalsohavevitaminsantibioticbsandplangrowhhormones.Thesegiveabigboosttotheplants withinamatterantibioticsandplant growth hormones. These give a big boost to the within a matterfewdays.Vermicastinghaveimmobilizedbeneficialsoilmicroorganismswhichstartmultiplicationandtheirbeneficialassoonastheyareappliedtothesoilandmulchedwithorganicresidues.Thismicrobialactivityalsotriggersthenativeearthwormswhichmay be present in the soil, though in small numbers.Thecocoonsassociatedwiththevermicastinghatchwithinamonth,if the conditions in the soil are favorable. Adequate mulch and watering is required. Temperature and moisture, which promote effective seed germination, willalsopromotehatchingandgrowth of earthworms. Cow, sheep, horse and similar the rfibrousmanuresserv east excellent BATCH food fortheyoungearthworms.These should be provide Dina 25mmlayer, below the mulch of celluloseresidues.Earthwormsattainsexualmaturitywithintwomonthsandstartmultiplyingtheirnumbers,ifprovidedwithadequatefoodandmoisture.They,however,stopreproductiononachievingacertaindensitypeculiartotheirspecies.Selectivepredationofearthwormsbybirds,moles,wildboarsandotheranimalsensurescontinuousreproductionandotheranimalsensurescontinuousreproductionandupgradatio

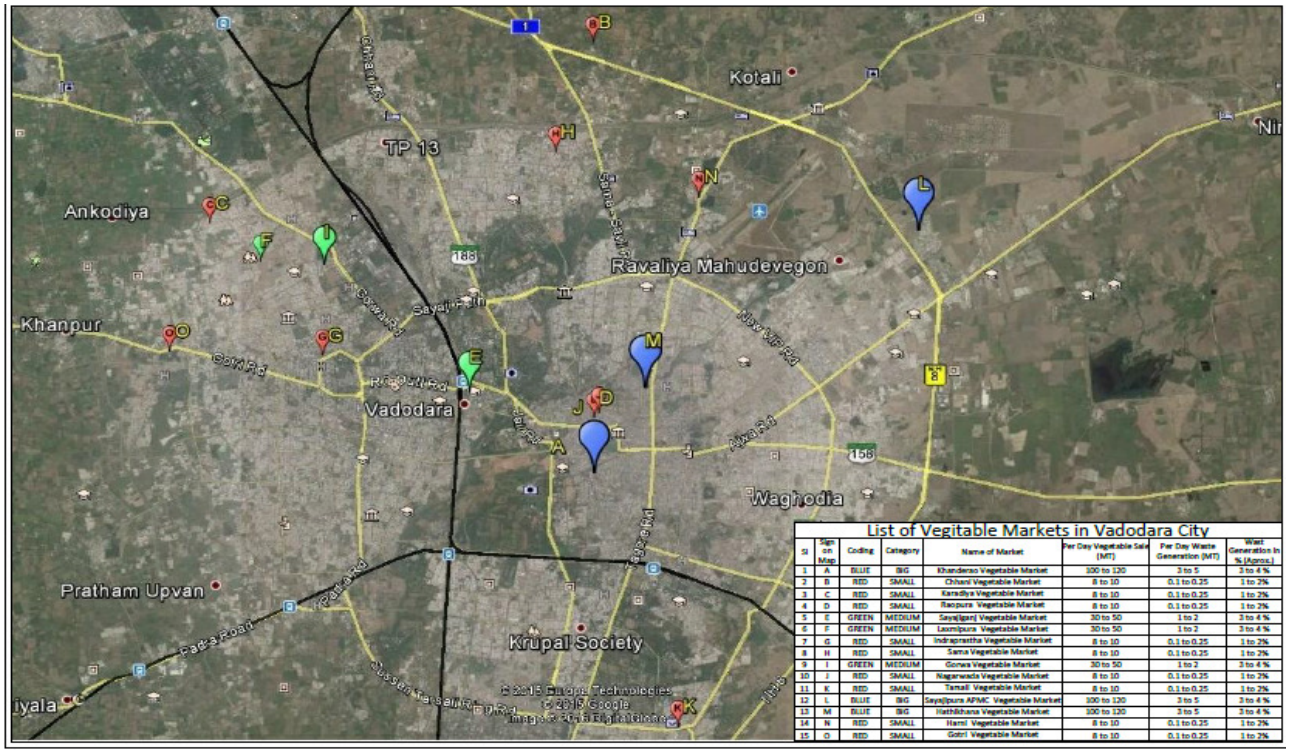
nofqualityofearthwormstosuitthelocalenvironment.Henceoneshouldnotbothertoomuchaboutthepredatoroftheearthworms. The yhaveauseful role to playing consuming lazy and ineffective earthworms

TABLE -3 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

VI. COMPOSITE SAMPLE

To collect the vegetable wastefirstofallpick10%ofmarket waste in the division so the sample shall be correct .In collecting sample th 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.



Sl	Sign on Map	Coding	Category	Name of Market	Per Day Vegetable Sale (MT)	Per Day Waste Generation (MT)	Waste Generation in % (Aprox.)
1	A	BLUE	BIG	Khanderao Vegetable Market	100 to 120	3 to 5	3 to 4 %
2	B	RED	SMALL	Chhani Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
3	C	RED	SMALL	Karadiya Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
4	D	RED	SMALL	Raopura Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
5	E	GREEN	MEDIUM	Sayajigunj Vegetable Market	30 to 50	1 to 2	3 to 4 %
6	F	GREEN	MEDIUM	Laxmipura Vegetable Market	30 to 50	1 to 2	3 to 4 %
7	G	RED	SMALL	Indraprastha Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
8	H	RED	SMALL	Sama Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
9	I	GREEN	MEDIUM	Gorwa Vegetable Market	30 to 50	1 to 2	3 to 4 %
10	J	RED	SMALL	Nagarwada Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
11	K	RED	SMALL	Tamali Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
12	L	BLUE	BIG	Sayajipura APMC Vegetable Market	100 to 120	3 to 5	3 to 4 %
13	M	BLUE	BIG	Hathikhana Vegetable Market	100 to 120	3 to 5	3 to 4 %
14	N	RED	SMALL	Harni Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%
15	O	RED	SMALL	Gotri Vegetable Market	8 to 10	0.1 to 0.25	1 to 2%

FIG.3.1 MAP SHOWING LOCATIONS OF VEGETABLE MARKET AT VADODAR

VII. 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

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