"SOLID WASTE MANAGEMENT BY COMPOSTING - A FEASIBILITY STUDY"

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Abstract: *Refuse is anything which is rejected as wor thless and discarded by society. All sorts of solid waste from a community can be also termed as refuse. Hence refuse includes all and non-put re scribal solid waste like garbage, rubbish, ashes, dead animal, industrial waste etc. Solid waste includes all those solid and semi-solid materials that are discarded by a community. These all wastes require different types of treatment before disposed or else they can cause water pollution, land pollution, air pollution and thus in general environmental pollution. So solid waste management is the proper storage, handling, trans partition, treatment, recycle and reuse of different types of solid wastes .Among the methodologies of solid waste disposal like composting, sanitary land filling, incineration, dumping, disposal at sea, paralysis' etc. Our project aims at selection of method in which a refuse and its disposal is done so that waste is reduced, recycled and reused as a byproduct is derived that is environment friendly and useful to agriculture and also there is solution to solid waste disposal problem.*

Key Words: solid waste, trench, test, compost

1 INTRODUCTION

1.1 General

Biodegradation is a natural process that is common occurrence in both human –made & natural environ ments. In the any organic material that can be bio logically decomposed compostable in fact, human beings have used this naturally occurring process for contraries to stabilize recycle agricultural & human wastes. To derive the maximum benefit from the natural decompo sition process.

Organic matter + O_2 + aerobic bacteria → CO_2 + NH_3 +H_2O + other end product-energy

High quality compost is free avoid of weed seeds & organisms that may be pathogenic to human, animals or plant. The composting process is environmentally sound & beneficial means of recycling organic material and not a means of waste disposal.

1.2 Principles of composting

A composting process harnesses the natural forces of decomposition to secure the conversion of organic waste into organic manure. The purpose of controlling the process are:

1. To make it aesthetically acceptable.

2. To minimize the production of offensive odors.

3. To avoid the propagation of insects.

1.3 Process Of Composting: Biological processes: The microorganisms begin to decompose the organic matter and produce Co_2, H_2O, heat &humus, microorganism consumes some carbon to from new microbial cells, to they increase thus population. When the organic molecules they require, are finished, they may become dormant. The chain of succession of different types of microbes continue, with there is little

decomposable organic material that is remaining is termed compost.

Decomposition: May proceed slowly at first because of smaller microbial population, but as population grows in the first few hours or days, they rapidly cause the decomposition of organic materials present in the full stock.

Chemical process: Several factor determine the chemical environment for composting as follow:

Carbon / energy sources: For their carbon energy source microorganisms in the composting process rely on carbon in the organic material.

Nutrient: The carbon-nitrogen ratio which is established on the basis of available carbon rather that concluded critically in determining the rate of decomposing.

Moisture: Exclusive moisture and flowing water from ground, which create potential liquid management problems including water and air pollution.

Physical process: The physical environment in the compost includes factors such as temperature, particle size, mixing pile size.

Particle size: As composting progresses there is natural process of size reduction and the particle size of the material being composted.

Temperature: Composting can occur at a range of temperature and the optimum temperature range is between 32^{o} to 60^{o} C. Temperatures above 65^{o}C are not ideal for composting as thermal destruction of all protein kill organism similarly.

Mixing: Mixing of feedstock, water and inoculants is important and is done by turning or mixing the pile after composting has begun. Mixing and agitation distribute moisture and air evenly and promote the breakdown of compost dumps.

2 LITERATURE REVIEW

2.1 Municipal Solid Waste (MSW) Composting Demonstration

Project(Maynard, 1993b and 1995)

In 1992, the towns of Fairfield and Greenwich conducted A trial of municipal solid waste (MSW) composting. The Waste, separated by homeowners, included food waste, yard Waste, wet and soiled paper, dry paper packages, diapers, Sanitary products and pet waste. A trial was conducted at Lockwood Farm from 1992 to 1994 on 10 X 10 foot plots surrounded by 3-foot aisles and replicated four times. The MSW compost was applied at the rates of 25 or 50 T/A, equivalent to a layer of about ½ inch and 1 inch of compost, respectively. The compost was incorporated into the soil by rot tilling. Control plots received no compost. All plots were fertilized once before planting with 10-10-10 fertilizer at a rate of 1300 lbs/A. Ten tomato plants per plot were grown from transplants. Vegetative suckers

were removed to the first flower cluster and the plants were staked.

2.2 Fertilizer/Compost Experiment: (Maynard, 2000) The garden demonstration plot is still being used but, Since it was not replicated, the results could not be statistically analyzed. A similar experiment was initiated in 1995 with replications at Lockwood Farm in Hamden and at the Valley Laboratory in Windsor to study the response of Vegetables to compost in two different soil types. Windsor has a sandy terrace soil with somewhat limited moisture holding capacity and Hamden has a loamy upland soil with moderate moisture holding capacity. Unscreened 2-year-old leaf compost produced in a passive pile turned two or three times yearly was applied in spring to plots at both sites for three consecutive years at the rate of 50 T/A (dry weight basis) (1 inch on the surface) and rot tilled into the soil to a depth of 6 inches.

3. METHODOLOGIES

3.1 Fundamentals of composting : The stabilization of organic matter in a modern composting process is accomplished by bacteria and micro-organisms that use large volumes of oxygen and produce considerable quantities of heat. the following conditions have been found to be desirable for efficient aerobic composting. Raw material should have a carbon to nitrogen ratio of 50 to 1 or less.

3.2 Method of composting

There are three methods of composting :

Composting by trenching

Open windrow composting

Mechanical composting

1. Composting by trenching: in this method trenches 4 to 10 m long,2 to 3 m wide and 0.7 to 1 m deep are excavated with a clear spacing of 2 m. the thickness are then filled with refuse / garbage in layer of 15 cm. on the top each layer 5 cm thick sandwiching layer of night soil /animal dung is spread in semi liquid form. On the top layer protruding about 30 cm above 10 cm is laid so that there are no problems of flies. Intensive biological action start in 2 to 3 days and organic matter decomposition starts. In this process considerable heat is generated and temperature of the composting mass rises to about 75^{o} C due to this fly breeding does not take place. The solid waste stabilizes in 4 to 6 months and gets changed in to a brown coloured odourless innocuous powdery from known as humus having high manure value because of its nitrogen content.

2.Open windrow compositing: In this method larger material like broken glass, pieces, stone, plastic articles etc. first removed and the remaining solid waste is dumped on ground in form of piles of 0.6 to 1 m height. The width and length of piles are kept as 1 to 2 m and 6m respectively. The moisture content is maintained at 60%, the piles are then covered with night soil/animal dung to supply necessary organism for biodegradation.

3.Mechanical composting: The composting by trenching and open windrow composting method requires very large area. The processes are may not be available and therefore mechanical composting is adopted which is very fast and mechanical device are employed in turning the solid waste undergoing composting. The stabilization of the waste takes only about 3 to 6 days.

3.3Composting – environmental effect :

Some effect of environmental consideration include the following :

1).Water impact: Water runoff from garden, waste composting facilities could contain large concentration of nutrients and metals that cause algal blooms in the nearby surface water. Municipal waste composting, sludge composting involve a large amount of potential contaminants & water impact could be greater at these facilities.

2).Land impact: At garden waste composting facilities, soil may become more acidic, due to the presence of pine needle in the compost pile. Nitrogen depletion may also occur, which can be limited by proper trekking MSW & co-composting facilities carry. The harmful impacts of acids & organic & metal contamination.

3.4 Advantages of composting

Composting is a one of the important methodologies of solid waste management. It is form of source of reduction waste pretension as the materials are completely diverted from the disposal facilities and require no management or transportation.

Solid waste in India contain up to 70% by weight of organic materials

Composting being generally of an organic material can significantly reduce waste stream volume.

Disadvantages:- The effectiveness of the composting operation is usually dictated by atmospheric conditions, and quality suffers during wet, cold or dry weather.

A high degree of control of moisture and temperature is required to achieve a satisfactory product.

High application rates are required to meet crop nutrient requirements.

Composting is more demanding than the direct application of manure to land.

The high capital and operating costs of the required turning machinery.

Labor costs extra.

There is a risk of dour generation during the compo sting process.

Practical image :

RESULT:-

P^h: - p^H value is 9.5.

Total suspended solid:- T.S.S= 650 mg/litre

Total dissolved solid: - T.D.S =1500 mg / litre

CONCLUSION:- As per the analysis of sample of compost by performing tests, we can conclude that the sample is suitable for best use in agriculture, gardening, etc.

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