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Vermicomposting – Solution for Milk Sludge

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Abstract

The ever growing industries, human population and urban areas have increased the generation of waste materials, which is polluting the entire environment. As the environment gets affected, indirectly human race is also affected. Industrial waste management has become a big issue in the present era. Though there are different methods of waste disposal, most of them lead to soil deterioration, toxic effect and increased pollution on land, air, water and living beings apart from being very expensive. We need an eco-friendly one stroke solution for disposal of waste, which not only manages the waste but in return gives some beneficial end product.

Vermicomposting is one such promising eco-friendly method which helps in reducing the pollution and simultaneously produces good quality compost using minimal space, labour and cost. Here an attempt is made to decompose milk sludge mixed with paper and garden waste with earthworms by vermicomposting. In one tank substrate is formed with paper and garden waste, milk sludge and cowdung in the ratio 3:1:1. And in another tank a ratio of 7:2:1 was considered. The reproduction of earthworms in the form of cocoons and the chemical composition of the generated manure after 30, 45, 60 days are noted and analysed.

It is noted that the manure generated from the first pit has a favourable C:N ratio and decomposes fast, whereas the second pit manure with a higher nitrogen content decomposes slowly and this type of manure can be used for potato, soya bean and corn plant. Milk sludge, highly odorous and difficult to dispose can be treated by this simple eco-friendly method.

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1. Introduction

Wastes are being produced since the beginning of civilization. During the early period, solid wastes were conveniently and unobtrusively disposed of as the density of population was low with large open land space. With the advent of industrialization and urbanization, and increasing human population has lead to increased accumulation of wastes and increased problems of waste disposal. High population density leads to intensive land use for residential, commercial and industrial activities which is having adverse impact on the environment.

The collection, transport, processing and disposal of solid wastes (which is highly visible and important municipal service) involve a large expenditure but receive scant attention. But to make our Earth more sustainable we have to improve these systems so that the load on Earth is reduced and the wastes are effectively recycled and re-used.(1)

1.1 Effect of Solid Waste on Health and Environment

Wastes generated from urban and industrial sources contain a large number of ingredients, some of which are toxic. The improper disposal of the solid waste in open areas in the city premises leads to health hazards like skin and eye infection, respiratory problems, cholera, typhoid, plague and intestinal disorders etc. The solid wastes dumped are in the form of organic matter, inorganic matter and biological impurities. The increased accumulation of these wastes in open area leads to generation of toxic wastes, which when comes in contact with rain water forms leachate. This toxic discharge consisting of heavy metals pollutes ground water, surface water and soil. It reduces the fertile lands which are used to produce food and raw materials. (1) (3) (4)

Further the pressure to increase the yield of food in the available productive land to the increasing population has led to the use of short duration hybrid varieties which lost their resistance towards pest and pathogen attacks. To fulfill the need of nutrition to crops and to protect the crops from pest and pathogen attack, the synthetic chemicals and fertilizer, pesticides, herbicides, nematicides and fungicides are being used and end up in the soil resulting in soil and groundwater pollution. Despite the fact that a variety of organic waste is available in the country but, not much progress has been made on their efficient utilization. On the contrary soil quality is deteriorating and increasing the cost of agricultures. Increasing pollution through human, animal, food and agriculture residues are the major concern facing mankind today. This may attributed to the poor nutrient supplying capacity as well as poor rate of mineralization.(3) (4).

There are different methods of disposal; and they can be stated as follows,

1) Sanitary Landfill
2) Composting

Sanitary land-filling is described as engineered burial of solid waste. In sanitary landfill the microbial degradation is at a very slow rate as compared to other biological treatment systems. The methane generated is wasted and the management of CO_2 and landfill gases are troublesome. Formation of leachate leads to pollution of surface and ground water. Apart from this abundant land is lost, which can't be used for years without any notable return.

Composting is a process wherein solid waste is digested aerobically and an-aerobically by the help of microorganisms and converted into humus and stable mineral compounds without much energy reduction.

1.2 Different Methods of Composting

Passive Windrow: It is one of the oldest and simplest methods. Here composting is done for shredded and screened organic matter in windrows with a moisture content of 50 to 60%. Even though simplest and cheapest method it produces poorest quality of compost, hence has very low market value. Apart from this substantial space and time is consumed and odour is generated.