Recycling Of Solid Waste By Vermicomposting In Campus Of B. G. College, Sangvi, Pune (M/S), India.

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Abstract: Solid waste management has become one of the biggest problems in urban areas. Improper dumping and fire to solid waste mainly cause water, soil and air pollution. Vermicomposting is one of the recycling technologies which is time reducing and effective process accelerating the composting of solid waste. The species of earthworm used in present study was Eudrilus eugeniae. Two separate beds were made in the college campus. One bed was used for semi composting of solid waste and other main bed was used for actual vermicomposting purpose. Solid waste generated in college campus was recycled by vermicomposting. Vermicompost was prepared and used as bio-fertilizer to garden plants.

Key words: **Solid waste, Recycling, Vermicomposting, B. G. College Sangvi.**

I. INTRODUCTION:

The biodegradable solid wastes are generated in college campus includes garden waste, canteen waste, papers waste etc. Generally compost pits are constructed in the backyard of many colleges. These composting pits produces long time odour, flies, flies and rodents along with a threat of infiltration of nitrate and other contaminants to groundwater (Primo et al., 2009; Sawyer, 1978). Normal process of composting is long lasting may causes health issues in society. Many methods are available for degradation of the solid wastes but these methods can make hazard to public health and create environmental problems by emission of various pollutants in air, water and soil. Thus vermicomposting is considered for degradation of solid waste generated in college campus because it is the time reducing and effective process to accelerate the composting of solid waste (Abbasi, T., et al 2009). Three top ways in the solid waste management were applied in the college campus i.e. Reduce, Reuse and Recycle. The recycling of organic solid waste is considered in present study.

Vermicomposting technology is world wildly used for solid waste management. It is the bioconversion of organic waste into a bio-fertilizer by the action of earthworms (Manyuchi. M .M et.al. 2013). The earthworms feed on the organic waste and the gut of earthworms acts as a bioreactor whereby the vermicasts are produced [Ansari, A. et. al. 2010].

II.MATERIAL AND METHODS:

The species of earthworm used in present study was *Eudrilus eugeniae* (Ritu Nagar et.al. 2017). Two separate beds (5 X 3 X 3 feet length, width and depth respectively) were made (Niño A. et.al. 2015) in the south west corner of college campus (Baburaoji Gholap College (18°34'37.6"N 73°48'33.6"E)**.** One bed was used for semi composting of solid waste and other main bed was used for actual vermicomposting purpose. Both the beds had one common brick wall for easy shifting of semi decomposed waste into the vermicomposting bed (Fig: 1). Floor of the beds were made by cement plasters to prevent leakage of water. The composting bed was layered with 4 inch brickbats, 3 inch coarse gravels, 4 inch coconut coir and 4 inch biodegradable campus solid waste including small pieces of garden waste, small pieces of papers, canteen waste etc. and covered with the slurry of 50 kg fresh cow dung treated with *Trichoderma* culture. Agitated after every 3 days for aeration and watered to maintain moisture. It was allowed for further degradation. After 20 -25 days of semi decomposed waste was shifted in vermicomposting bed.

The vermicomposting bed was made ready with layering of 4 inch brickbats, 3 inch coarse gravels (Fig: 2), 4 inch coconut coir and 4 inch semi-decomposed waste taken from the composting bed, 6 inch treated aerobic bedding, 2kg of *Eudrilus eugeniae* species of Earthworms (Fig: 3), covered with the slurry of 100 kg fresh cow dung. Watering of all above layers had been done. (Fig: 4). The vermicomposting tanks was covered with wet jute cloth to maintain the moisture. The vermicomposting bed was covered with wiremesh lid to protect from rats, bandicoots, birds, cats, dogs and other animals. Proper fabricated shed was made on above the tanks to protect it from heavy rainfall and sunlight (Fig: 1). The outlet pipe of vermicompost bed was covered with wire-mesh lid to prevent the entry of rats and bandicoots. Daily water was sprayed on vermicomposting bed to keep moisture. Aerobic condition was maintained in both the beds throughout the study by providing 5mm diameter holes at 100mm c/c spacing all along the width and the length of walls of the beds. The vermicompost bed was covered with wet gunny bags to to provide darkness and earthworms were allowed to settle on bottom. The vermicomposting bed was kept undisturbed till the surface appears black and granular, it indicated process almost completed. Watering was stopped before one week of harvesting. The top layer of granular vermicompost was collected without disturbing bottom layer (Fig: 5). Collected vermicompost was sieved to get fine and uniform vermicompost (Ritu Nagar et.al. 2017). The nutrient composition of collected vermicompost was tested in the laboratory and used as bio-fertilizer to garden plants (Fig: 6).

III. RESULT AND DISCUSSION:

The reproduction of earthworm species Eudrilus eugeniae was faster and produced one cocoon per day. Newly hatched individuals grown faster and accumulated body weight at the rate of 10 mg/day. The specimens attained maturity within 40-45 days. A week later, newly matured individuals started production of cocoons. Mature earthworms were settled in bottom. The excreta and cocoons were observed on top layer of vermicomposting bed. No mortality of earthworms was observed during experiment. The texture of vermicompost was dark black colored with granular forms. Collected vermicompost was odourless. It was observed that collected vermicompost was lighter in weight and floats on water surface. Vermicompost was used as manure and applied botanical garden plants (Fig: 6). Vermicompost provided trace elements, enzymes and nutrients to the soil and enhanced the growth of garden plants (Nagavallemma, 2004). All biodegradables solid wastes generated in college campus were converted into organic manure and recycled in college campus. The use of chemical fertilizers and pesticides were reduced. The full scale designs of composting and vermicomposting beds in B. G. College campus was helped to implement the biodegradable solid waste reductions as a part of its sustainable campus initiatives.

Fig: 1

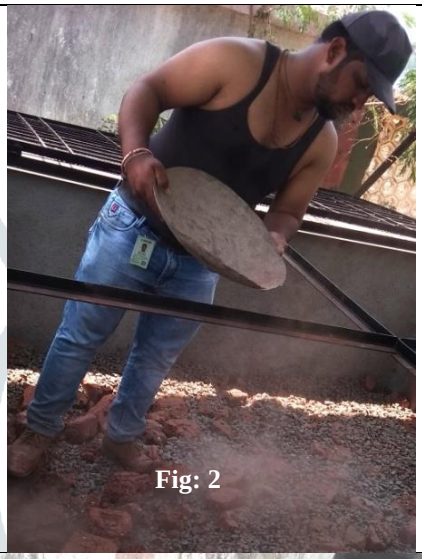
Fig: 2


Fig: 3

Fig: 4


Fig: 5


Fig: 6

IV. CONCLUSION:

The earthworm feeds on microbes present in waste and excrete them out as vermicast along with nutrients nitrogen and phosphorus in their excreta (Rajiv K. Sinha et.al. 2015). Vermicomposting technology played a vital role in the decomposition of waste material and brought the efficient nutrient recycling and enhanced plants growth. The study reveals that the good quality of bio-fertilizer was obtained from vermicompost bed. Vermicomposting is an effective method of recycling the biodegradable waste produced in college campus. The objective of the study was achieved where vermicomposting was found to be effective in campus solid waste reduction.

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