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Research Article

A Survey of Solid Waste Management in Chennai (A Case Study of Around Koyambedu Market and Madhavaram Poultry Farms)

Abstract

The well managed successful waste management programme increases the health and environmental quality of the country. This survey examines the status of Solid Waste management at metropolitan city, Chennai, Tamil Nadu (Koyambedu market and Madhavaram poultry farms). This survey is helpful for the people to make awareness about waste management. A pretested and self-administered questionnaire was used for primary data collection covering 100 peoples which were selected randomly. Data were analyzed according to the descriptive statistics. Different organic wastes comprising plant and animal constituents such as vegetable waste- lady's finger, Brinjal, Radish, Beans carrot, chow-chow, beetroot, clustered beans, snake gourd, tomatoes, egg shell, feather, skin etc. The results also showed that 58% of the households were not aware of waste recycling, reuse & reduction.

Introduction

Industrialization, fast urbanization and population development have affected the healthy relationship between human beings and nature. Numerous human activities produce huge amounts of solid wastes throughout the world and their management has become a technical and environmental challenge. Many of the garbage are removed in ecologically unsustainable manner by open dumping or burning, or minimum quantity of waste was enzymatically decomposed with microorganisms due to their ability to secrete enzymes. These environmentally harmful garbage disposal approaches may lead to losses of nutrients, economically and affect the air, soil and water [1].

An imperative feature of soil is that it influences the efficiency of our planet's environment through harboring and nurturing various forms of life and consequently results in creation of outstanding and energetic biodiversity. Being one of nature's greatest complex environments, soil contains thousands of dissimilar organisms, which interrelate and subsidize to the global rotations that make all life potential. Soil produces a complicated network of communities that again assemble themselves as smaller communities occupying detailed microhabitats [2].

Organic matter plays a key role in agricultural manufacture because it owns many desirable properties such as high water holding capacity, cation interchange capacity, and capability to sequester pollutants and nutrients comprising both organic and inorganic constituents and exert helpful effects on physical, chemical and biological features of soil [3]. The wastes of the animal and plant origins are organic and degradable in nature and upon degradation; the end products deliver a good source of nutrients to increase soil efficiency. In developing countries, the organic wastes are degraded by using aerobic and anaerobic techniques which may affect the adjoining water and soil [4]. To avoid the pollution due to accumulation of wastes, waste management is a significant task in the Urban and Cosmopolitan cities. Several waste management strategies are adopted depending upon the waste nature, quantity and its heterogeneous constituents. For bio-solid wastes, composting is the best option to not only degrade the wastes but also to generate end products enriched with nutrients to improve soil fertility. Though microbial composting and vermicomposting are used to decompose the bio-solid wastes, but individually they suffer the disadvantage of complete decomposition of wastes comprising both plant and animal constituents. Microbial composting is advantageous in degrading animal wastes but not preferable for degrading plant wastes as they do not secrete cellulose or ligninase enzymes to completely degrade plant constituents; whereas vermicomposting can efficiently degrade plant wastes but inefficient in degrading animal wastes. Here we have used a combined approach, wherein microbial composting followed by vermicomposting of

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organic garbage to produce composts enriched in nutrients to improve soil fertility as well as the productivity of vegetation.

Methodology

Solid waste generation

Koyambedu market — the source of health giving vegetables for the city — may well showcase what's wrong with our city when it comes to how we treat organic waste that can be easily recycled. In a bid to put in place an integrated solid waste management system in the sprawling Koyambedu wholesale market complex, the Market Management Committee has floated a national tender calling for bids from private firms for collection and disposal of the garbage. At present, the market generates some 150 tons of organic waste every day that gets mixed and dumped with the plastic and inert material at dumpyards. And, not all the waste generated every day is cleared, littering the market with eyesores and leading to foul smell. Of that vegetable waste 7-10 tons of waste per day apart from fruit and flower shop. Every day, about one lakh people visit this sprawling market complex that sprawls 300 acres. However, they have little choice but to carefully navigate vegetable-waste strewn roads. Traders said that only 70-80 per cent of the garbage generated by over 3,000 shops is cleared [5].

Salient features of the study area

Koyambedu Wholesale Market Complex (KWMC) is one of Asia's largest perishable goods market complex located at Koyambedu, Chennai. The market complex is spread over an area of 295 acres (1.19 km2). Chennai Metropolitan Development Authority (CMDA) was constituted as an ad-hoc body in 1972 and become statutory body in 1974 vide the Tamil Nadu Town and Country Planning Act 1971. Inaugurated in 1996, the complex consists of more than 1,000 wholesale shops and 2,000 retail shops. It abuts Poonamalee High Road and Nesapakkam Road. In Phase I, a wholesale market for perishables was developed in an area of around 70 acres (280,000 m2) by constructing 3,194 shops. The market has two blocks for vegetable shops and one each for fruit and flower shops and the vegetable market will have about 500 shops. Poultry Research Station was established in the year 1941 at Nandanam as Poultry Research Station and relocated at Madhavaram Milk Colony, Chennai, in the year 2011. The campus is spread over an area of 3.2 hectares. The study area include in around nugabakkam shops also.

Survey in koyambedu market and madhavaram poultry farm area

A survey was conducted with 100 people to make awareness on vegetable and poultry waste management at metropolitan city, Chennai, Tamil Nadu (Koyambedu market and Madhavaram poultry farms). This survey Conducted face-face interviews, one member of each shop who was within the age bracket of 18-74 years was selected to be interviewed. This survey is helpful for the people to make awareness about waste management. The survey was conducted with eleven questions as follows:

a. Total no of person: 100

b. Type of waste: vegetable and animal wastes

S. No	Content of the Questionnaire	Yes	No
1	Type of waste		
2	Amount of waste disposed per day		
3	Methods used for waste disposal		
4	Availability of private dump yard		
5	Means of garbage removal		
6	Availability of common waste collection center		
7	Awareness on the type of waste		
8	Awareness on disposal of waste as instructed by government/Private Organization		
9	Regularity in disposal of the dumped waste		
10	Knowledge on vermicomposting and manure production		
11	Proposal for waste management		

Results

Survey in organic waste management

Site and personnel surveys were conducted for the adoption of waste management practices and awareness among personnel of organic waste management at Koyambedu market and Madhavaram poultry farm of Chennai metropolitan city, Tamil Nadu. The following questionnaires were used for this survey as follows table 1:

The following observations are made based on the questionnaire inputs:

1. Spoiled vegetables and fruits as wastes were reported by 55 peoples; feed waste, poultry wastes including debris of birds, rotten eggs and feathers were disposed by 37 persons and food waste was reported by 8 persons.

2. Quantity of waste disposed by respondents: 51 persons stated that they dispose vegetable and fruit wastes of 30 kg/day, 42 persons dispose 50-60 kg/ day poultry waste and 7 persons dispose 100-200 kg/day of food waste.

3. Methods of waste disposal: There was no special method used other than dumping by many of the respondents (%) or; 100 persons reported that they handover the wastes to municipality or corporation.

4. The availability of dump yards in these study areas are minimal and only 7 persons are reported to put the wastes in dumping yard.

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Table 1: Questionnaires used in this survey.

S. No.	Questionnaires	Yes	No
1	Type of waste	Spoiled vegetable and fruits (55 persons)	Waste feed, slaughter or poultry wastes, broken eggs and feathers (37 persons)
2	Quantity of waste disposal per day	30 kg/per person (51 persons)	50-60 kg/per person (42 persons)
3	Methods used for waste disposal	There is no special method other than dumping the waste in municipal service (100)	-
4	Availability of private dump yard	7 Nos.	93 Nos.
5	Means of garbage removal	Municipal service (71 persons)	Private Service (29 persons)
6	Availability of common waste collection center	89	11
7	Awareness on the type of waste	42	58
8	Awareness on disposal of waste as instructed by government or Private bodies	23	77
9	Regularity in disposal of the dumped waste	7	93
10	Knowledge on vermicomposting and manure production	13	87
11	Proposal for waste management	-	100

5. Means of garbage removal: 71 and 29 persons reported that they availed municipal service and private service respectively for waste disposal.

6. Waste collection center - Most of the people (89) reported that they had collection center while 11 people reported absence of such centers.

7. Awareness: Over less than 50 persons of the sample population are aware of the different types of wastes.

8. Awareness of disposal waste guided by government / private organization: There was no awareness as reported by 77 people and 23 people know about guidance of the government /private agencies.

9. Disposal waste: 93 persons did not dump the waste whereas 7 persons regularly disposed the waste by dumping it.

10. Vermicompost: Most of the people (87) unaware about vermicompost procedure and only 13 persons know about the vermicompost but not practiced.

11. Proposal for waste management: All respondents agree that there was no proposal/scheme/plan for waste management.

Discussion

Types of wastes and waste processing systems in urban community settings

Municipal solid waste management is a major concern in Indian urban cities, especially the Chennai city of Tamil Nadu state. It has been reported that about 0.75 kg of solid waste produced in Chennai per capita every day which is the highest in the country. Municipal solid waste is generally collected, transported and dumped devoid of any treatment and processing. Huge volume of wastes was left unattended along the roadsides and river banks. Open discarding of garbage enables the breeding of disease vectors and dumpsites increase the risk of groundwater contamination [6]. In Chennai, for the first time solid waste management was contracted out to the French company Onyx [7]. Although in spite of municipal solid waste rules, the greater Chennai corporation continued to dispose the collected waste at open dumpsites, adding ongoing risks to the environmental and public health [8]. In the present study, Survey was conducted on awareness of organic waste management at Koyambedu market (a largest vegetable market in India) and Madhavaram poultry farm of Chennai metropolitan city, Tamil Nadu. The findings of the present study revealed the perspective on organic waste collection and disposal. Almost 50% of the respondents in the survey areas improperly dispose spoiled vegetables and fruits. About 30% of the participants dispose poultry waste at Madhavaram area and these wastes are not processed as there is no solid waste treatment facility. It was observed that public dump solid vegetable wastes at Koyambedu and poultry waste at Madhavaram due to the respective markets are available in these areas. Based on the response by the participants, it was observed that much of them are disposing of about 30 kg of vegetable and fruit waste while some persons disposing of 50-60 kg of poultry waste and a few participants mentioned that they were disposing 100-200 kg of food waste per day. All the participants stated that they were not using any special method other than dumping. A majority of people were not using private dump yard whereas the few of the participants reported to use private dump yards. Some of the participants reported availing services from municipality and others use private service for removal of garbage. Most of the people agreed that they were having a waste collection center; however, few of them did not aware about the system and it shows that there is a lack of dissemination of awareness and correct practices to the public. Most of the participants were found to be not having awareness about the types of waste. While a few participants knew the different types of waste but did not aware about the management of the waste. Very few participants replied that they were having awareness on waste disposal as instructed by the government or by a private organization. But most of the respondents were not found to have awareness on the waste disposal. Waste disposal was not carried out in a rational

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means by the almost 90% of the participants. Predominant respondents did not know about the vermicomposting and manure production from organic wastes, while few participants having knowledge on the vermicomposting process. None of the participant was found to have a plan or possible strategy to process the waste effectively. From the results of the present survey, it is clearly evident that the people in urban settings surrounding the markets are not having awareness on the types of wastes and disposal of waste; hence, most of the participants are not regularly disposing the wastes. Hence, there is a need to create an awareness regarding the management of the organic waste and also the use of the vermicompost to process these wastes for generating manure suitable for agriculture productivity. Though the participants are generally worried about the environment due to dumping of wastes, they do not have plans and proposals to manage them in an ecofriendly manner. Garbage has become a serious environmental and health issue and hence, community participation is of ultimate importance. There is a great need to create the right awareness by organizing public education and awareness programs on types of waste, origin, waste disposal, waste management and associated health and environmental implications of wastes and ecofriendly waste processing methods.

Summary

Essential techno-economically feasible and eco-benign approaches are required in the management of solid wastes. As the population keeps growing, there is a continued pressure on environmentalists to derive effective solutions for waste disposal. There is an upcoming need for sustaining the environment safe and clean and this will be the most important challenge in recent years to tackle with.

A continuing rise in the rate of waste production is no longer acceptable – hazardous waste affects the health of millions of people and poisons large areas of our planet. In many places people live surrounded by garbage and landfills. It is essential that governments and corporations face up to waste, using what we know about reduction, recycling and reuse, but also developing new technologies that eliminate waste.

Indian municipalities have been striving hard for effective Organic Waste Management (OWM) in their cities. However, today it becomes challenge for them to endeavor for the betterment of our environment through proper management of wastes and its treatment. Because of lack of waste collection and processing systems for organic solid wastes, most of the wastes get mixed and these wastes become heterogeneous in nature having origins of plants and animals in various proportions. These wastes are dumped in streets and mostly in drains, thus serving as a key contributor for infectious diseases. The collected wastes are being uncontrollably disposed thus causing soil/water and even air pollution. These problems arise, due to improper resource allocation and also via non-optimal rating. The public must also be aware of proper waste disposal which is quite necessary in today's world. Also the local bodies/communities must lend their hands in rehabilitating the previously existing dumping sites and measures has to be taken on identifying new landfills for the waste disposal. Research efforts should focus on biological methods of waste treatment that suite organic wastes and its geography.

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